SERVICE MANUAL

Ves matic 10

Rev.1.0 of 25/11/2005

Automatic instrument for determining the erythrocyte sedimentation rate (ESR)

(Patented)

(Diagnostic Device CE-IVDD 98/79)

DIESSE DIAGNOSTICA SENESE SPA

LIST OF REVISIONS

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CHAPTER 1

GENERAL DESCRIPTION OF THE INSTRUMENT **1**

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1.1. OVERALL VIEW OF THE UNIT

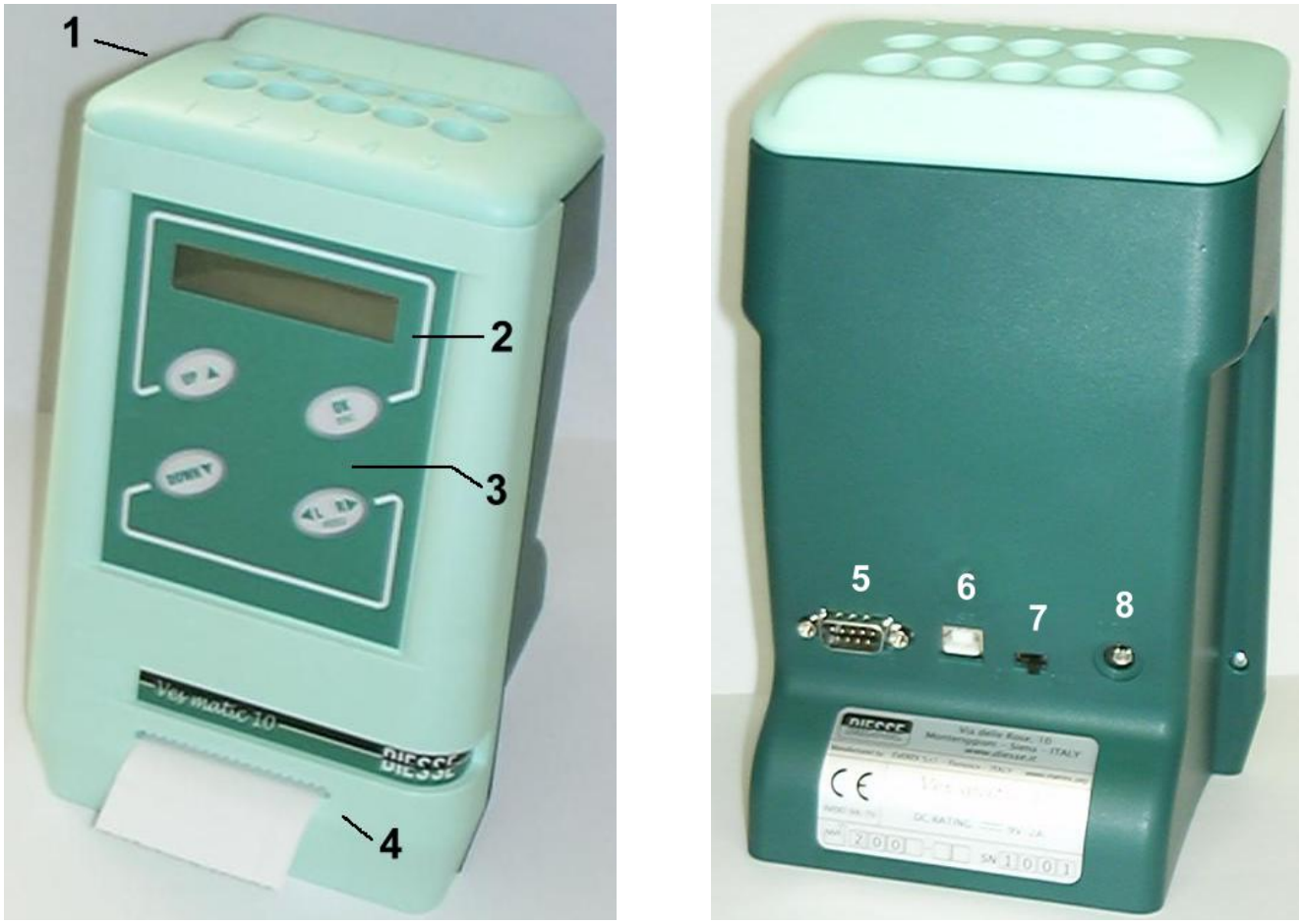
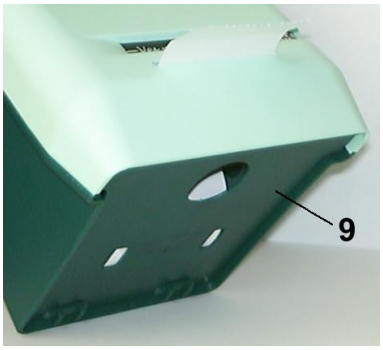


Fig. 1-1

Legend:

1) Cuvette-holder with 10 numbered positions
2) Display
3) Keyboard
4) Printout-Paper slit
5) EXTERNAL BARCODE connector (External Barcode Reader)
6) USB connector
7) ON/OFF switch
8) DC IN socket for 9Vdc power supply
9) Paper-holder compartment



1.2. TECHNICAL SPECIFICATIONS

Power supply	9Vdc@2A	
Dimensions	143 x 218 x146 mm (w x h x d)	
Weigh	1.2 Kg	
Ambient temperature	Operational	from +15 to +35°C
	Storage	from + 5°C to + 45°C
Relative humidity tolerance	from 20 to 80% without condensation	
Central unit	AVR ATMEGA128-16AC microprocessor	
Display	LCD with Backlight, 16 characters x 1 row	
Cuvette-holder	With 10 numbered recesses for the relative cuvettes	
Optical unit	10 pairs of opto-electronic elements in solid state (photodiode + phototransistor).	
Printer	Alphanumeric with thermal paper 58 mm wide, 36 characters per line, speed: 20 mm/sec.	
Interfaces	USB	
Device safety	EN61010-1	
EMC	EN61326-1	
Installation category	III	

1.3. CONTENT AND PACKAGE DIMENSIONS

MATERIAL SUPPLIED WITH THE INSTRUMENT

The VESMATIC 10 is supplied with the following material:

- 1 Instruction manual [English] [Order Code: P30600471]
- 1 Rapid instructions for Power Supply [Order Code: P30600490]
- 1 "VESMATIC 10"CD [Order Code: P30650020]
- 1 Power Supply 9Vdc 2A [Order Code: P30402840]
- 1 USB 1.1 A-B M/M Cable (1.5mt) [Order Code: P21890360]
- 1 Thermal Roller Paper for Printer [Order Code: P12300000]
- 1 Packing-list & Final Inspection Report

Package dimensions

WIDTH (box)	cm	32
HEIGHT (box)	cm	25
DEPTH (box)	cm	23
GROSS WEIGHT	g	2300
PACKAGING WEIGHT	g	400

Do not throw away the original packaging in case of further transportation of the instrument in the future.

1.4. SHUTTING DOWN AND SHIPPING

Before shutting down and shipping the instrument it is recommended carrying out the following sanitising procedure:

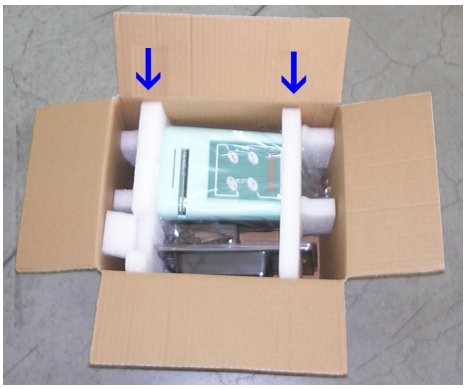
A) The instrument must be turned off and cleaned internally of all residues or spillage with a liquid detergent and left to dry.
B) Use one of the ready-to-use spray cans of isopropyl alcohol available on the market.
C) Spray well on the sample-holder.
D) Leave turned off for at least one hour before beginning a new work cycle or any other type of operation on the instrument.

Instrument maybe damaged if dropped.

SHIPPING

1. Fit the foam blocks onto the instrument to protect it.

2. Insert the instrument and power supply unit into the box.



3. Fit the strip of ethafoam and the accessories into the power supply side of the box and close the lid.

If the instrument is being shipped to the manufacturer for repairs, affix a copy of the "**Fault Report**" form (contained in this document) to the outside of the box.

CHAPTER 2

DISASSEMBLY PROCEDURE (and reassembly) **5**

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2.1. GRAPHICS

Legend of graphic symbols used on the Instrument [Standard applied: EN980:2003].

Instrument satisfying requirements of european directive on in vitro diagnostic medical devices (98/79/EC).

IVD — In vitro diagnostic medical device.

Date of manufacturing.

SN — Serial number.

Legend of Electrical and Safety symbols used on the instrument:

Attention, read the manual and observe the relative safety symbols.

WEEE: Disposal of Waste Electrical and Electronic Equipment - At the end of its life, this instrument should be disposed of according to separate waste collection provisions [2002/96/EC, 2003/108/EC]

Legend of Symbols used on the document:

WARNING, potential hazard of personal injury, all the conditions indicated in the associated text must be stored and understood before proceeding.

WARNING, potential danger of damaging the instrument all the conditions indicated in the associated text must be known and understood before proceeding.

ATTENTION, important information.

2.2. PRELIMINARY TASKS ASSIGNED TO THE TECHNICAL SERVICE

Before any type of operation on the instrument:

a) TURN OFF THE ON/OFF SWITCH ON THE UNIT.
b) DISCONNECT THE INSTRUMENT FROM THE POWER SUPPLY IN ORDER TO PREVENT RISK OF CONTACT WITH ANY ENERGISED ELECTRICAL OR MECHANICAL PARTS.

FAILURE TO OBSERVE THESE INSTRUCTIONS SHALL RELEASE THE MANUFACTURER OF THE VESMATIC 10 FROM ALL LIABILITY.

2.3. EQUIPMENT / INSTRUMENTATION REQUIRED

- Multimetre - Mod.Fluke 8010A or equivalent.
- Set of screwdrivers.
- Set socket-head spanners.
- 5.5mm Plug socket spanner.
- Digital thermometer.
- 10 Cuvettes containing 2ml Latex [Code 19900490]
- 10 Cuvettes containing 3ml Latex [Code 19900500]

2.4. DISASSEMBLY AND REASSEMBLY PROCEDURES

Disassembly procedure

a) Follow the instructions in paragraph 2.2 points a) and b).

b) Remove the lower lid code 10602170 (Pos.007-Tab.30003530), lift up the printing head (see point 3.2) and remove the paper from the printer.

c) Use a screwdriver to unscrew the 4 screws M3x12 (pos.202-Tab.30003530) anchoring the front panel code 30208600 (pos.002-Tab.30003530) to the rear panel code 30208610 (pos.001-Tab.30003530).

d) Ease out the upper lid (Pos.006-Tab.30003530) anchored to the side panels by the springs on the moulds.

d) Disconnet the wiring attached to the Ves-Matic 10 Connection Board (Pos.101-Tab.30003530) in order to access the electrical and mechanical parts of the instrument.

Reassembly procedure

Follow the steps of the disassembly procedure in reverse.

Make sure to prevent the wires from becoming entangled in the mechanical parts during this phase.

CHAPTER 3

CALIBRATIONS AND PERIODICAL CHECKS **9**

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3.1. PROCEDURE FOR CALIBRATING THE VES MATIC 10 FOLLOWING DISASSEMBLY OR PERIODIC CHECKS.

3.1.1. ACCESS TO THE SERVICE MENU

Starting up the system

PROCEDURE:

1. Turn on the instrument.
2. When the instrument turns on, it carries out an automatic check of its system:
   - Check Display.
   - Check Clock.
   - Check Temperature Sensor.
   - Check Data contained in the EEprom.
   - Check Motor Movement and Home Sensors.
   - Check Read sensors.
   - Check Printer.

During this phase the instrument model and the software version installed in the instrument will be displayed:

SW VERS.1.00

In the event of any malfunctioning, the instrument will emit an acoustic signal and display an error message. Please refer to Chapter 5 – Intervention Procedure – for troubleshooting the fault.

SENSOR X KO

If this message is displayed when the instrument is turned on, do not use the position 'X' indicated for the processing of samples as the read sensor associated with this position may be damaged.

Use the key ▲ to display the list of damaged sensors and pass over to the Main Menu.

Once the initial self-testing is over, the following message will be displayed.

SELECT FUNCTION

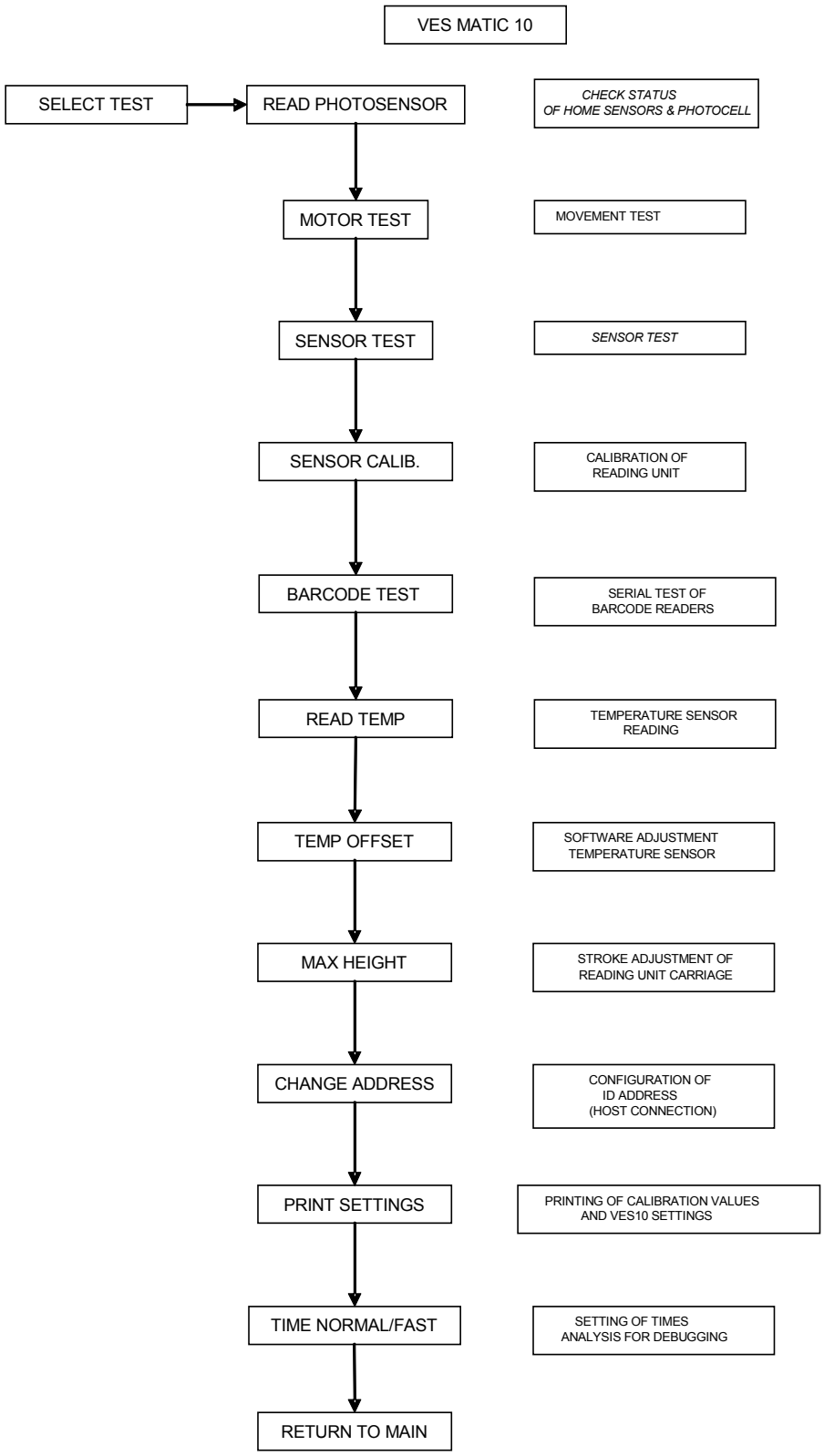
The instrument is now ready to perform the functions that will be selected.

Access to the Service Menu

1. In order to access the Service functions it is necessary to press in sequence the following keys in the Select Function:
   OK 3 TIMES - ▲ 3 TIMES –**OK** TWICE.
2. The following message will be displayed:

SELECT TEST

The SERVICE menu supplies a list of useful functions for the various calibration and testing operations described below:



To exit select RETURN TO MAIN MENU and press **OK**.

For testing and calibration it is necessary to use the printer, therefore it is recommended to check that the printer is working and that it contains paper.

3.1.2. TEST STATUS OF SENSORS & HOME PHOTOCELL

[READ PHOTOSENSOR]

This function allows for performing the first check of the status of the optical sensor (the software sets the current of the emitters at 20mA by default) and home photocell.

Useful function for the testing of the boards before mounting on the movement/analysis unit and for an additional check before closing the instrument with side safety panels.

Procedure:

1. Select the item 'READ PHOTOSENSOR' with the ▲ and ▼ keys from Select test menu and then press **OK**.
2. The instrument is set up for carrying out these tests with the carriage of the reading unit in two different positions:
   - with the reading unit in the home position (on standby)
   - with the reading unit in mid-stroke (by initially moving the motor).

   As soon as this function is selected the software displays the following request:

MOTOR (YES = OK)

   - Press **OK** to perform the test of the sensors and Home photocell with the carriage of the reading unit one third along the maximum stroke.
   - Press any key to perform the test in the Home position.
3. The sensors will be displayed in the following format:

LLLLL LLLLL L

   Photograph of the status of the optical and mechanical sensors of the instrument.

   L= Light-OPEN D= Dark-CLOSED
4. By performing simple manual operations, like inserting and extracting a test tube from one of the 10 positions in the test tube tray or blacking out the Home photocell, it is possible to check the functioning .

Press any key to return to the previous menu.

3.1.3. MOTOR TEST

This function allows for performing the first test for checking the motor movement; more specifically, it checks that the complete stroke has been carried out in the scheduled time (and preferably without losing the motor pitch*) as well as checking that the home photocell functions correctly (in the case of errors the message ERROR READING will appear on the display or the number of STEPS LOST during the movement will be printed).

Procedure:

1. Select the item 'MOTOR TEST' from Select test and press **OK**.
2. The number of motor steps to be performed is requested:

CYCLE NUMBER 1

To set the number of cycles (max 20 cycles) :

- Use the ▲/▼ keys to change value of the units.
- Use the **Line Feed** key to increase by 10 the value to be set.

3. To confirm the value entered and start the cycle press **OK**.

The instrument allows a 30-second pause between each cycle.
*It is foreseen that the instrument may lose several steps during the movement without however any affect on the quality of the readings. The motor strokes are to be considered as valid as long as the loss of the steps is ≤ a 20 (corresponding to 0.5mm) (see Printing Report).

3.1.4. SENSOR TEST

[SENSOR TEST]

This function allows for checking the motor steps by measuring the height of the test tubes.

Procedure:

1. Select the item 'SENSOR TEST' from the Select test menu
2. Introduce 10 cuvettes containing the test strips into the test tube trays and press OK.
3. The instrument will perform a full stroke and displays the following message:

YYYYY YYYYY

Where Y = YES position occupied, value valid. N = Non present.

Press OK to return to the previous menu.

3.1.5. SENSOR CALIBRATION

To perform the calibration (fine tuning) of the sensors it is necessary to use 10 test tubes containing 3ml calibration latex [LOW] [Code 19900500] and 10 test tubes containing the 2ml calibration latex [HIGH] [Code 19900490]

The instrument foresees two calibration modes, either for single sensors or simultaneously for all 10 optoelectronic units.

Procedure for calibrating the10 optoelectronic units:

- Select the item 'SENSOR CALIB.' from the Select test menu and press OK
- At the request 'ALL=OK SINGLE=UP' press OK to start the simultaneous calibration procedure.
- The instrument will take the reading carriage to mid-stroke and request the inserting of the test tubes with the 3ml calibration latex [LOW] 'INSERT LOW'
- Press OK once the test tubes have been inserted on LOW.
- The instrument will carry out a series of reading until, on lowering the current to the emitter sensor, it manages not to perforate the 3ml latex .
- At this stage the instrument will request the insertion of the test tubes containing the 2ml calibration latex [HIGH], 'INSERT HIGH', insert the test tubes and press **OK**.

- The instrument will carry out a series of readings until, via the adjustment of the emitter sensor current, it manages not to perforate the 2ml latex.
- The instrument calculates the mean value between the two readings of each group and memorises it in the EEPROM as well as printing a report.

Procedure for calibrating one single sensor:

- Select the item 'SENSOR CALIB.' from the Select test menu and press OK
- At the request 'ALL=OK SINGLE=UP' press ▲ to start the procedure for calibrating one single.
- The position of the sensor to be calibrated will appear on the display:

SENSOR 1

- Use the ▲/▼ keys to select the position to be calibrated if different from the one displayed and press OK to start up the calibration procedure.
- The instrument will take the reading carriage to mid-stroke and request the inserting of the test tube with the calibration latex 3 [LOW] 'INSERT LOW'.
- Press OK once the test tube has been inserted on LOW.
- The instrument will carry out a series of reading until, on lowering the current to the emitter sensor, it manages not to perforate the 3ml latex .
- At this stage the instrument will request the insertion of the test tubes containing the 2ml calibration latex [HIGH], 'INSERT HIGH', insert the test tube and press **OK**.
- The instrument will carry out a series of readings until, via the adjustment of the emitter sensor current, it manages not to perforate the 2ml latex.
- The instrument calculates the mean value between the two readings of the group calibrated and memorises it in the EEPROM as well as printing a report.
- The software is set for calibrating the next sensor after the one calibrated.

To exit from the Sensor Calibration menu press **Line Feed** (at any point of the programme except for during the calibration).

3.1.6. BARCODE TEST

This function allows for testing the communication and speed of the serial port and the external reader. It is advised only to connect the barcode reader to the instrument when turned off.

Procedure:

1. Select the item 'BAR CODE TEST' from the Select test menu,
2. Press OK: the following request will appear on the display:

INSERT BARCODE

3. Take a barcode and check that the code indicated on the display matches the one on the test tube.

Press OK to return to the previous menu.

3.1.7. READ TEMPERATURE

This displays a temperature read by the sensor onboard the CPU. If the temperature sensor is defective on the display the error message LM70 FAILURE will be displayed.

Procedure:

1. Select the item 'READ TEMP' from the Select test menu.
2. Press OK, the temperature read by the sensor will appear on the display.
3. By using a digital thermometer and inserting a thermocouple in a position of the test tube tray check the validity of the reading.

Press OK to return to the previous menu.

3.1.8. TEMPERATURE OFFSET

If a deviation exists between the temperature displayed and the temperature measured by the digital thermometer, use this function to align at the software level, the temperature read by the sensor on the board with the real temperature.

Procedure:

1. Select the item 'TEMP OFFSET' from the Select test menu.
2. Press OK and the correction factor to be entered will appear on the display.
3. Use the ▲/▼ keys to change the value (from -8°C min. to +8°C max. with respect to the temperature read by the sensor LM70).
4. Press OK to save the value entered and return to the previous menu.

3.1.9. ADJUSTING THE CARRIAGE STROKE READING

[MAX HEIGHT]

Adjustment necessary in the event of the following problem occurring: during the movement the read sensor carriage completes the upwards stroke and tries to go further than the maximum height, resulting in a loss of steps (Error printout) or fails to correctly complete the stroke up to the maximum height.

Procedure:

1. Select the item 'MAX HEIGHT' from the Select test menu,
2. Press OK, the max. height set in mm will be displayed.
3. Use the keys ▲/▼ to change the value (from 64mm min. to 72mm max.) with 0.1mm steps.
4. Use the **Line Feed** key to increase or decrease by 0.5mm at a time.
5. Press OK to save the value entered and return to the previous menu.

3.1.10. CONFIGURATION OF ID No.

[CHANGE ADDRESS]

This menu allows for setting the ID number of the instrument to allow for identifying it during connection to the mains.

Procedure:

1. Select the item 'CHANGE ADDRESS' from the Select test menu.
2. Press OK, and the address entered will appear on the display.

ADDRESS 0X00

3. Use the keys ▲/▼ to change the value of the units (hexadecimal, from 0 to F).
4. Use the **Line Feed** line to increase the value to be set by 10 hexadecimals.
5. Press OK to save the value entered and return to the previous menu.

The programming software is pre-arranged to communicate with the instruments with and ID number of '00'.
Therefore, before beginning to update the instrument it is advisable to carry out a check and if necessary set the ID number to 00. At the end of the programming restore the ID used.

3.1.11. PRINT SETTINGS

At the end of the calibrating, this function allows for obtaining a printout that summarises the settings of the instrument (including the calibration values of the sensors).
More specifically, it contains:

- the SW version installed
- the ID address and speed of the serial ports (USB and Barcode)
- date and time set
- the temperature read by the sensor and the software correction factor
- the maximum stroke set for the reading carriage
- settings (refer to the Operating Manual)
- parameters of the QC set (refer to the Operating Manual)
- the current values of the10 sensors (mA) memorised.

3.1.12. CONFIGURATION OF TEST MODE

[TIME NORMAL/FAST]

This menu allows for reducing the analysis time to the simple mechanical movements of the instrument and it is therefore possible to rapidly check the settings of the instrument during an analysis cycle.

Procedure:

1. Select the item 'TIME NORMAL/FAST' from the Select test menu,
2. Press OK, the mode set will appear on the display:

NORMAL

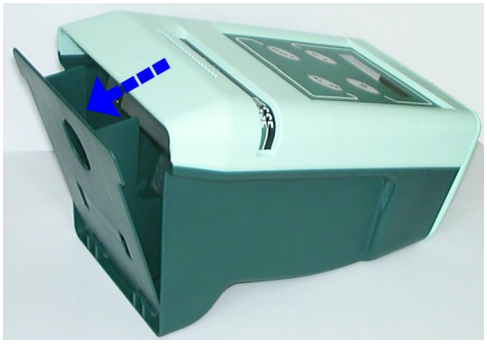
3. Use the key ▲ to set FAST mode.
4. Press OK to save the value entered and return to the previous menu.

These ANALYSIS CYCLES ARE NOT VALID for scientific purposes
Turn off and turn on the instrument again to restore normal functioning.

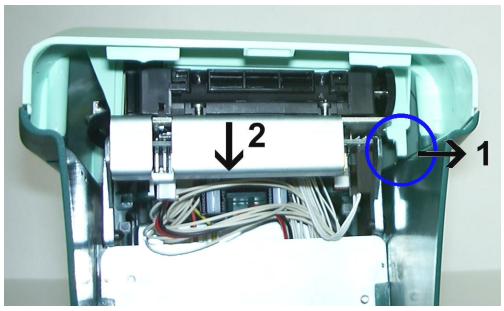
3.2. CLEANING THE PRINTER HEAD

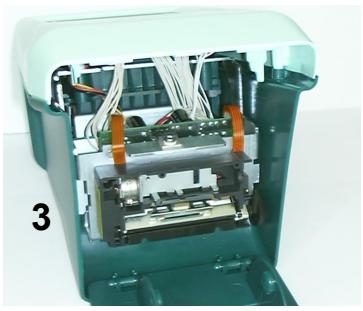
To clean the printer head follow the steps below:

1. Disconnect the instrument from the power supply.
2. Carefully ease the instrument over onto its back and open the printer compartment.

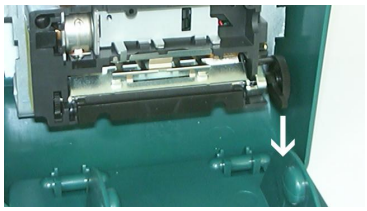


3. Lift up the lever indicated in figure (1) to unhook (2) and tip up (3) the printing device.



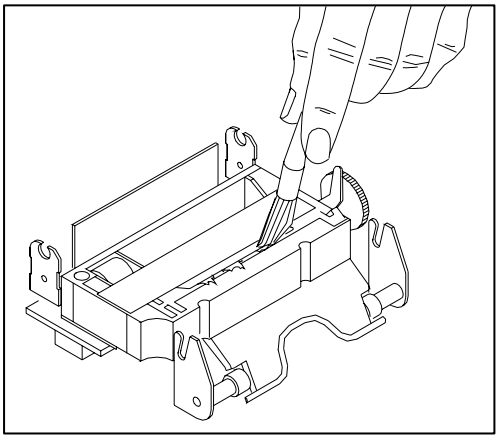


3. Lift up the printer head by raising the side lever.



4. Finally, proceed with the removal of the ends of the paper and clean the head.

N.B.: For removing of the paper and cleaning **only ever use products designed specifically for printer heads.**



Follow the above steps in reverse in order to reassemble the printer again.

In order to replace the paper refer to chapter 5 of the Operating Manual.

CHAPTER 4

LEARNING ABOUT THE UNIT- DESCRIPTION OF THE MAIN MODULES 19

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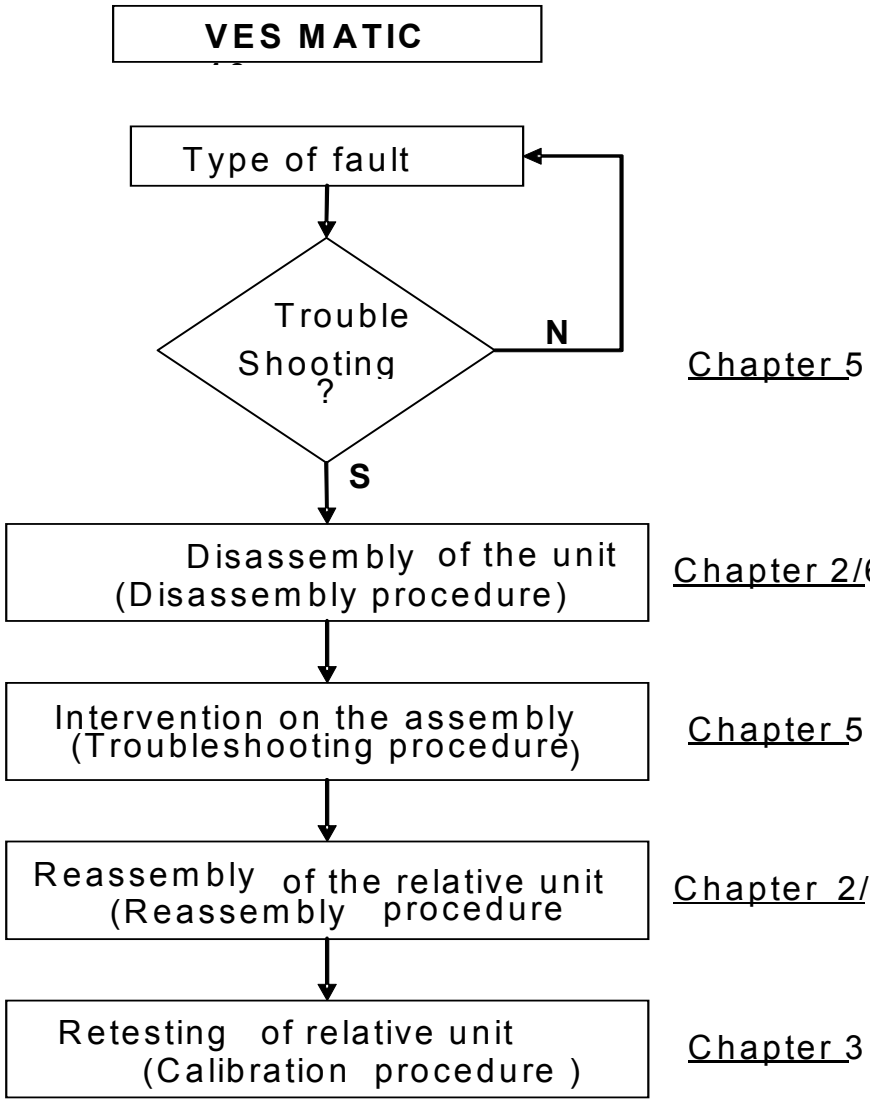
4.1. LEARNING ABOUT THE UNIT

1. Follow the instructions in paragraph 2.2.
2. Open the safety guard of the unit as indicated in paragraph 2.4.
3. Gain access to the assemblies relating to the various procedures enclosed (Flow Chart no.1).



Flow-Chart n°1

4.2. CPU BOARD

4.2.1. Description of the module

The CPU board allows for controlling and managing all the peripheral units connected to the same, processing the data supplied regarding the read sensor boards and calculates the Westergren value at the 1st and 2nd Hours and the Katz index of every sample examined.

This is mainly subdivided into the following blocks:

1) MPU and ADDRESS/DATA BUS CONTROL block [U2- ATMEGA 128]
   This block consists of microcontrollers that carry out the functions dictated by the programme residing in the same. It has a 16 Mhz system clock and a bus speed of 16 Mhz (speed of carrying out an operation).
2) MEMORY block [U2]
   FLASH-Eprom Integrated in the microprocessor where the management programme is housed, the capacity of which is 128 KByte x 8Bit where the MPU transfers data or variable in a temporary manner with entirely random access.

4.2.2. Applicable documentation

20010140	VES MATIC 10 interconnection diagram	(6.4.)
20103291	Electrical diagram of the VES MATIC 10 CPU BOARD	(7.1.)
30119870	Layout of the VES MATIC 10 CPU BOARD	(7.1.)

4.2.3. Access to single modules

a) Turn off the instrument and disconnect from the power supply.
b) Access the unit as indicated in paragraph 2.4.
c) Unscrew the 4 screws M3x12 (Pos.202-Tab.30003530) and disassemble the analysis handling unit 30208220 (Pos.004-Tab.30003530) and the printer unit 30208230 (Pos.005-Tab.30003530).
d) Unscrew the 6 screws M3x8 (Pos.201-Tab.30003530) anchoring the Ves-Matic CPU 10 board, code 30119870 (Pos.100-Tab.30003530) to the front panel (Pos.002-Tab.30003530).
e) Disconnect the wires connected to the board and proceed with the replacement of a new CPU.
f) Repeat the above steps in reverse to reassemble instrument.

In the event of replacing CPU board it will be necessary to carry out a new CALIBRATION and FINE TUNING of the instrument (Chapter 3)

4.3. VES10 CONNECTION BOARD

4.3.1. Description of the module

The Ves-Matic 10 connection module consists principally of the integrated LM7805 that generates 5Vdc on the board, necessary for the functioning of the CPU board.
Moreover, there is also a power supply connection for the printer on the board, and the connectors for interfacing with external equipment [USB-EXTERNAL BARCODE].

4.3.2. Applicable documentation

20010140	VES MATIC 10 interconnection diagram	(6.4.)
20103310	Electrical diagram of the VES MATIC 10 CONNECTIONS	(7.2.)
30120010	Layout of the VES MATIC 10 CONNECTION BOARD	(7.2.)

4.3.3. Access to single modules

a) Turn off the instrument and disconnect from the power supply.
b) Access the unit as indicated in paragraph 2.4.
c) Unscrew the 2 screws M3x8 UNI5931 (Pos.204-Tab.30003530) to remove the Connection Board (Pos.101-Tab.30003530).
d) Proceed with the replacement of the board.
e) Repeat the above steps in reverse to reassemble the instrument.

During the reassembly phase pay attention to the anchoring of the dissipater on IC1 with M3x8 screws and spacer rings (Pos.200-Tab.30003530) for isolating the board from the metal brackets of the rear unit 30208610 (Pos.001-Tab.30003530)

4.4. VES10 SENSOR AND HOME PHOTOCELL READING BOARDS

4.4.1. Description of the module

The 2 read sensors read each of the heights of the blood columns contained in the 5 test tubes (from 1 to 5 cod. 30119990 and position 6 to 10 code 30120000) and transform the optic signals acquired into electrical signals which they send to the MPU of the CPU board for being processed.

4.4.2. Applicable documentation

20010140	VES MATIC 10 interconnection diagram	(6.4.)
20103290	Electrical diagram of the V10 READ SENSOR	(7.3.)
30119990	Layout of FRONT V10 READ SENSOR BOARD	(7.3.)
30120000	Layout of REAR V10 READ SENSOR BOARD	(7.3.)
30111640	Layout of WIRED PHOTOCELL	(7.4.)

4.4.3. Access to single module

a) Turn off the instrument and disconnect from the power supply.
b) Access the unit as indicated in paragraph 2.4.

Replacing the Read sensor Boards

c) Use a Phillips screwdriver to unscrew the 2 screws M2.5x6 (Pos.203-Tab.30208220) and remove the Sensor le Sensor Boards (Pos.101/102-Tab.30208220)
d) Disconnect the wiring connected to the same.
e) Proceed with the replacement and reassembly following the steps above in reverse.

Replacing the Home photocell

c) Use a 5.5mm plug-socket spanner to remove the nuts M3 (Pos.007-Tab.30208220) anchoring the photocell wiring to the analysis stand (Pos.001-Tab.30208220).
d) Disconnect the wiring on the CPU Board side.
e) Reassemble a new photocell using the 3mm spacers (Pos.202-Tab.30208220) and reconnect it to the CPU board.

During the reassembling phase make sure to centre the photocell with respect to the tongue of the limit switch located on the bottom of the rear reading stand (Pos.005-Tab.30208220).

f) Clamp the wires together with a strap.

4.5. PRINTER INTERFACE MODULE.

4.5.1. Description of the module

The Printer Interface (pos. 083), consisting principally of an integrated circuit (U1) of the ATMEL AT908515 type, has the task of managing the printing operation and the serial communications with the CPU board of the instrument.

The management of the printing device involves the feeding of the paper, management of the end-of-paper and head raised sensors, and the control of the dots of the thermal head.

4.5.2. Applicable documentation

20010140	VES MATIC 10 interconnection diagram	(6.4.)
20102462	Small WT01 Printer Interface diagram	(7.5.)
30111340	Small WT01 Printer Interface board layout	(7.5.)

4.3.3. Access to single module

a) Turn off the instrument and disconnect from the power supply.
b) Access the unit by opening the lid as indicated in chapter 2.
c) Detach the power supply cable connected to the connector CN11.
d) Detach the serial connection cable connected to the CN12.
e) Remove the safety guard pos. 004 unscrewing the screws in positions 217 and 219.
f) Extract the Interface board of the module by removing the screws marked on the layout 30111340 of the board pos. 082
g) Proceed with the replacement of the components affected by the various faults as indicated in point 5.4.6.

CHAPTER 5

TROUBLE-SHOOTING FOR SINGLE FAULTS 25

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5.1. ANALYSIS OF THE FAULTS

The faults indicated in the following paragraphs refer to the troubleshooting procedures performed for each individual fault in order to highlight the types of action to be taken in the case of faults.

After any type of signalling of an *Error* it is recommended to :

- Repeat the entire operation at least once more in order to ascertain that the error is not due to external causal factors, like the cutting off or momentary fluctuation in the power supply for example.
- Check the setting parameters wherever possible.
- Check the continuity of the connections before proceeding with any type of replacement.

Apart from carrying out command and control operations of the peripherals, the C.P.U. also constantly monitors the most important parts of the instrument.
Whenever a fault is detected the process in progress is automatically stopped and an acoustic signal given while a message appears on the screen at the same time, signalling the type of fault or shortcoming occurring.

5.2. PROBLEMS/FAULTS AT START-UP

5.2.1. The unit fails to turn on

a) Check that the power supply source is functioning.
b) Check the power supply cable and the polarity of the power supply which must be:

c) Check the ON/OFF switch on the rear of the unit.
d) Check the input and output power supply on the Connections board.
IN= 9Vdc [J1] OUT= 5Vdc [CN1 pin 5 and 8]; 9Vdc [CN3; CN1 pin 7 and 8]

5.2.2. The unit turns on / Display KO-Keyboard KO

Overall effect	**- - - - - - -(DISPLAY ERROR)**
Message on the display	**The unit fails to accept the command introduced by the KEYBOARD**
Type of fault	▪ On turning on, the display fails to show any messages and/or it shows strange characters and the instrument emits a prolonged acoustic signal. ▪ The display can be viewed by fails to light up. ▪ The display can be viewed but fails to accept any commands introduced from the keyboard.
Modules affected	CPU BOARD [see 4.2.]
Checks recommended	▪ Check the powers supplies towards the CPU board ▪ Make adjustments to the contrast with the R1 trimmer on the Board. ▪ Reset the CPU Board [Attachment B: Updating of Software]
Corrective Action to be taken	▪ Replace the CPU Board code 30119870

5.2.2. The unit turns on / Initial reset KO

The unit turns on but the self test is carried out incorrectly and either displays error messages or is not performed at all.

Overall effect ***Message on the display***	*Fails to carry out initial Reset-*
Type of fault	The instrument is not correctly energised. The Software has not been installed correctly.
Modules affected	External power supply CONNECTIONS board [see 4.3] CPU board [see 4.2]
Checks recommended	▪ Check the input and output power supplies on the Connections board (Connectors CN1-CN3) , that is: IN= 9Vdc [J1] OUT= 5Vdc [CN1 pin 5 e 8]; 9Vdc [CN3; CN1 pin 7 e 8] ▪ Check the powers supplies on the CPU board. ▪ Reset the CPU board [Attachment B: Updating the Software]
Corrective Action to be taken	Depending on the fault, replace the following Power supply unit code 30402840. Connections board code 30120010. CPU board code 30119870.

(The initial operations are carried out incorrectly)

Overall effect ***Message on the display***	**RTC FAILURE (Clock error)**
Type of fault	The programme fails to read or update the date and time. There is probably a communications breakdown between the component housing the programme and the component that memorises the date and time.
Overall effect ***Message on the display***	**LM70 FAILURE (Temperature error)**
Type of fault	The programme fails to read the temperature or detects incorrect data. In this case either the component that detects the temperature is damaged or there are communication problems between the component itself and the component housing the programme.
Modules affected	CPU board [4.2.]
Checks recommended	▪ Check the power supplies on the CPU Board. ▪ Reset the CPU Board [Attachment B: Updating of Software]
Corrective Action to be taken	▪ Replace the CPU Board code 30119870.

Overall effect ***Message on the display***	**UNCALIBRATED (Sensors uncalibrated)**
Type of fault	The instrument has lost the adjustment values of the optoelectronic units. This is probably due to the fact that the programme fails to detect valid values in the EEPROM. BY pressing **OK** these values will be restored at the default values unless other problems also exist.
Modules affected	CPU board [4.2.]
Checks recommended	▪ Check the power supplies on the CPU board. ▪ Recalibrate the optoelectronic units and by turning off and turning on the instrument again, check that the calibration values are saved correctly [use the Print Settings functions]. ▪ Reset the CPU Board [Attachment B: Updating of Software]
Corrective Action to be taken	▪ Replace the CPU board code 30119870.

Overall effect ***Message on the display***	**EEPROM FAILURE**
Type of fault	The instrument has lost the data relating to the analysis memorised in the archive. This is probably because on turning on the instrument the programme fails to detect valid values in the archive save on the EEPROM. By pressing **OK** the archive will be formatted (the Procedure last approximately 20 seconds).
Modules affected	CPU Board [4.2.]

Checks recommended	▪ Check the power supplies on the CPU board. ▪ Carry out an analysis cycle with valid test tubes. At the end, turn the instrument off and on again and use the Print Archive function (see Operating Manual), to check that the analysis results are correctly save in EErprom. ▪ Reset the CPU Board [Attachment B: Updating of Software]
Corrective Action to be taken	▪ Replace the CPU board code 30119870.

Overall effect ***Message on the display***	**SENSOR X KO / ALL SENSORS KO** **(SENSOR ERROR** in the Printing Report**)**
Type of fault	This could be an electrical fault due to the sensors or the photocell of the limit switch of the motor.
Modules affected	CPU Board [4.2.] V10 FRONT AND REAR READ SENSOR BOARD [4.4] WIRED PHOTOCELL [4.4.]
Checks recommended	▪ Check the power supplies on the CPU board. ▪ Check the continuity of the connections between the CPU Board and the Read Sensor Board and between the CPU Board and the wired Photocell ▪ Carry out a check of the status of the Home photocell and the optoelectronic units (Use the READ PHOTOSENSOR function with the carriage raised to a third of its maximum height)
Corrective Action to be taken	Depending on the fault, replace V10 Front Read Sensor Board code 30119990 (KO pos.1-5) V10 Rear Read Sensor Board code 30120000 (KO pos.6-10) Wired Photocell code 30111640 CPU Board code 30119870.

Overall effect ***Message on the display***	**ERROR READING**
Type of fault	This is probably due either to the movement of the reading unit failing to finish within the limits established or the Home sensor of the reading unit being defective.
Modules affected	CPU board [4.2.] PHOTOCELL WIRED [4.4.]
Checks recommended	▪ Check the power supplies on the CPU board. ▪ Check the continuity of the connections between the CPU board and the Wired Photocell and between the CPU board and the Wired Motor code 30120740 ▪ Make a check of the status of the Home photocell (use the READ PHOTOSENSOR function with the carriage raised to a third of its maximum height) ▪ Carry out several of the test movements (using the Motor Test function) and check the correct sliding of the reading unit.

Corrective Action to be taken	Depending on the fault, replace Wired Motor code 30120740 Photocell Wired code 30111640 CPU board code 30119870.

5.2.3. The unit turns on / Printer KO

Overall effect ***Message on the display***	**INSERT PAPER (Insert paper in the Printer)**
Type of fault	This message appears when the software detects that there is no more paper in the printer.
Modules affected	SMALL WT01 PRINTER INTERFACE BOARD [4.5.]
Checks recommended	▪ Replace the roll of paper in the printer (see point 5.3. of the Operating Manual) ▪ Check the continuity of the connections [CN3] between the Interface Printer Board and the printer (Pos.100-Tab.30208230)
Corrective Action to be taken	Depending on the fault, replace Printer board. WT01 code 30111340. Printing device code 21430120.

Overall effect ***Message on the display***	**HEAD DOWN (Printer head down)**
Type of fault	This message appears whenever the software detects the printer head raised.
Modules affected	SMALL WT01 PRINTER INTERFACE BOARD [4.5.]
Checks recommended	▪ Correctly position the head lever (see point 5.3. of the Operating Manual). ▪ Check the continuity of the connections [CN3] between the Interface Printer Board and the printer (Pos.100-Tab.30208230)
Corrective Action to be taken	Depending on the fault, replace Printer board. WT01 code 30111340. Printer device code 21430120.

Overall effect ***Message on the display***	**PRINTER ERROR (Serial Printer error) or** **the printer fails to print correct characters**
Type of fault	This message appears whenever the serial communication between the printer and the C.P.U. board is not carried out correctly.
Modules affected	SMALL WT01 PRINTER INTERFACE BOARD [4.5.] CPU BOARD [4.2.]

Checks recommended	▪ Check the power supplies on the CPU board and on the Printer Interface Board. ▪ Check the continuity of the connections between the CPU board [CN3] and the Printer Interface Board [CN12] ▪ Turn on the instrument again and after pressing the relative key in the Select Function menu, check that the printer performs a line-feed (feeding of the paper by one row) ▪ Check the signals of the serial communication on the CPU side and the Printer Interface side.
Corrective Action to be taken	Depending on the fault, replace Printer board. WT01 code 30111340. CPU board code 30119870.

Overall effect ***Message on the display***	**PRT DISABLED? (Printer Disabled?)**
Type of fault	This message appears when the printer signals an error.
Modules affected	----------
Checks recommended	▪ In order to avoid interrupting the analysis cycle in progress, the operator may disable the printer following the signalling of an error, by confirming with the **OK** key. Once the problem indicated has been solved, the results of the analyses can still be printed as they will have been saved in the EEPROM archive.
Corrective Action to be taken	----------

Overall effect ***Message on the display***	**Printer compressed**
Type of fault	The printer fails to feed the paper correctly into the device.
Modules affected	SMALL WT01 PRINTER INTERFACE BOARD [4.5.]
Checks recommended	▪ Check the power supplies on the Printer Interface board ▪ Check that there are no residues of paper inside the printer head, otherwise carry out the cleaning indicated in paragraph 3.2. ▪ Check the rotation of the side knob (head engaging)
Corrective Action to be taken	Depending on the fault, replace the Printer board WT01 code 30111340. Printing device code 21430120.

5.2.4. The unit turns on / External connections KO

Overall effect ***Message on the display***	**???? (Barcode reading error)**
Type of fault	This message appears when the reading of the sample identification number by an external barcode reader fails to acquire the codes or acquired them incorrectly.
Modules affected	CPU board [4.2.] CONNECTIONS board [4.3]
Checks recommended	▪ Check the status of the label bearing the barcode, and if necessary replace it and try again. ▪ Check the power supplies on the CPU board and the output connectors of the Connections board. ▪ Check the continuity of the connections between the CPU board and the Connections board. ▪ Using the TEST function????
Corrective Action to be taken	Depending on the fault, replace CONNECTIONS board code 30120010. CPU board code 30119870.

5.3. TROUBLESHOOTING DURING THE OPERATING PHASE

Overall effect ***Message on the display***	**SAMPLE ABSENT (Sample ABSENT)**
Type of fault	This message appears during printing due to the absence of cuvettes o in the presence of samples with haematocrit values < 15%.
Modules affected	
Checks recommended	▪
Corrective Action to be taken	

Overall effect ***Message on the display***	**EMPTY (Sample EMPTY)**
Type of fault	This message appears during printing whenever the instrument identified empty cuvettes or cuvettes with samples with haematocrit values < 15%.
Modules affected	
Checks recommended	▪
Corrective Action to be taken	

Overall effect ***Message on the display***	**LOW (Sample LOW)**
Type of fault	This message appears during printing whenever the level of the sample is too low or with samples with haematocrit values < 15%.
Modules affected	
Checks recommended	▪ Correctly fill the cuvette with the same blood sample following the instructions in the illustrative leaflet enclosed in the cuvette packet.
Corrective Action to be taken	

Overall effect ***Message on the display***	**HIGH (Sample HIGH)**
Type of fault	This message appears during printing whenever the level of the sample is too high. This may also be due to a fault in the optoelectronic elements.
Modules affected	
Checks recommended	▪ Reduce the contents of the cuvette following the indications in the illustrative leaflet enclosed in the cuvette packet, seal well and repeat the analysis.
Corrective Action to be taken	

Overall effect ***Message on the display***	***
Type of fault	This message is printed whenever there are discrepancies in the readings, that is. Whenever the value of the VES 1h is < of the value of the reference reading or whenever the value of the VES 2h is < of the value of the VES 1h. This may also be due to a fault in the optoelectronic elements.
Modules affected	
Checks recommended	▪ Check the status of the sample inside the test tube (e.g. if coagulates are present). Correctly insert the test tube into the sample holder and repeat the analysis.
Corrective Action to be taken	

Overall effect ***Message on the display***	**!! ANALYSIS ABORTED !!**
Type of fault	This is printed whenever the work cycle has been interrupted or an analysis cycle is launched without having introduced the samples into the sample holder.
Modules affected	
Checks recommended	▪ Check the status of the sample inside the test tube (e.g. if coagulates are present). Correctly insert the test tube into the sample holder and repeat the analysis.
Corrective Action to be taken	

CHAPTER 6

EXPLODED DRAWINGS AND COMPONENT LISTS FOR UNITS **35**

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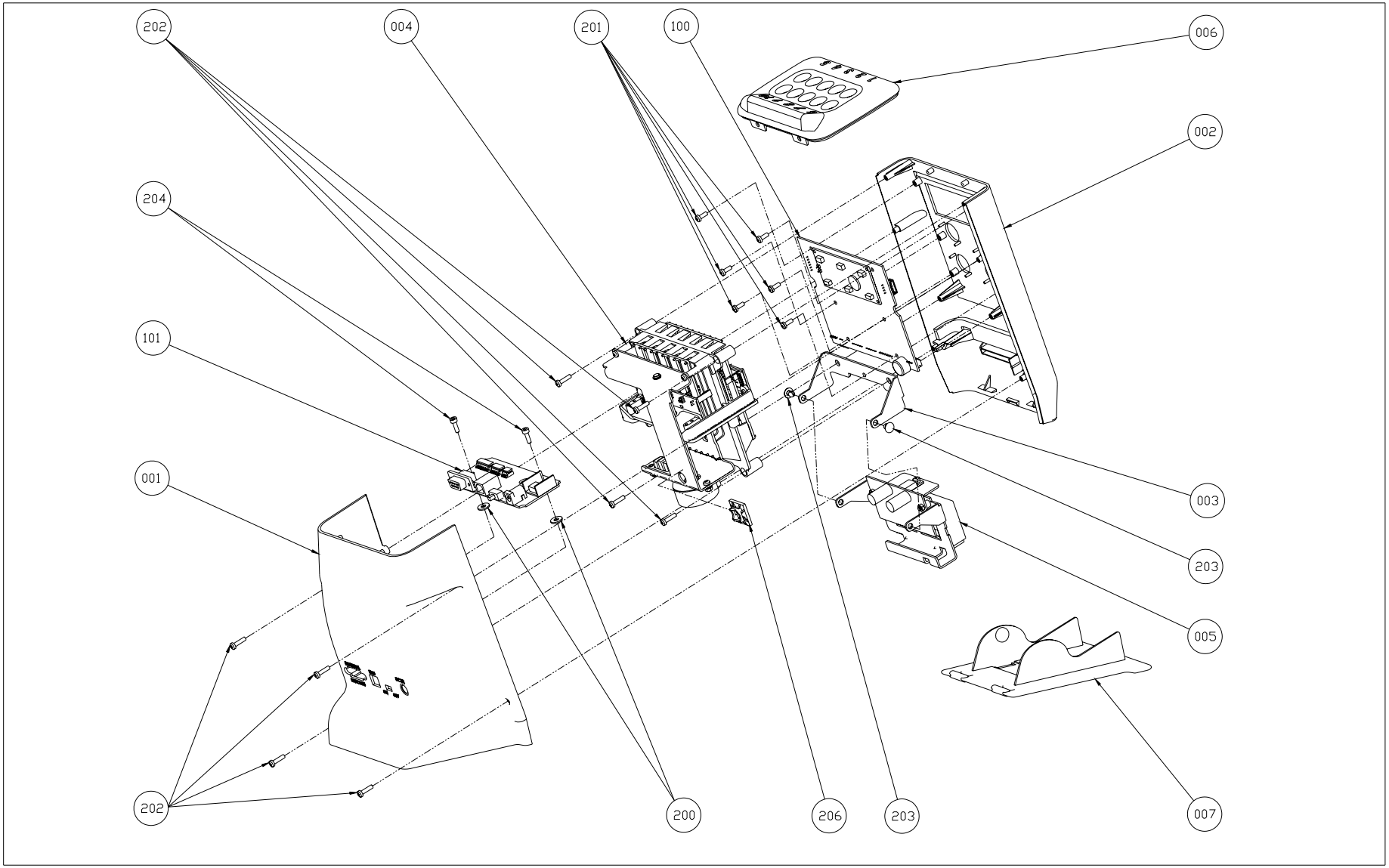
6.1. VES MATIC 10 UNIT (30003530)

Exploded drawing



Component list

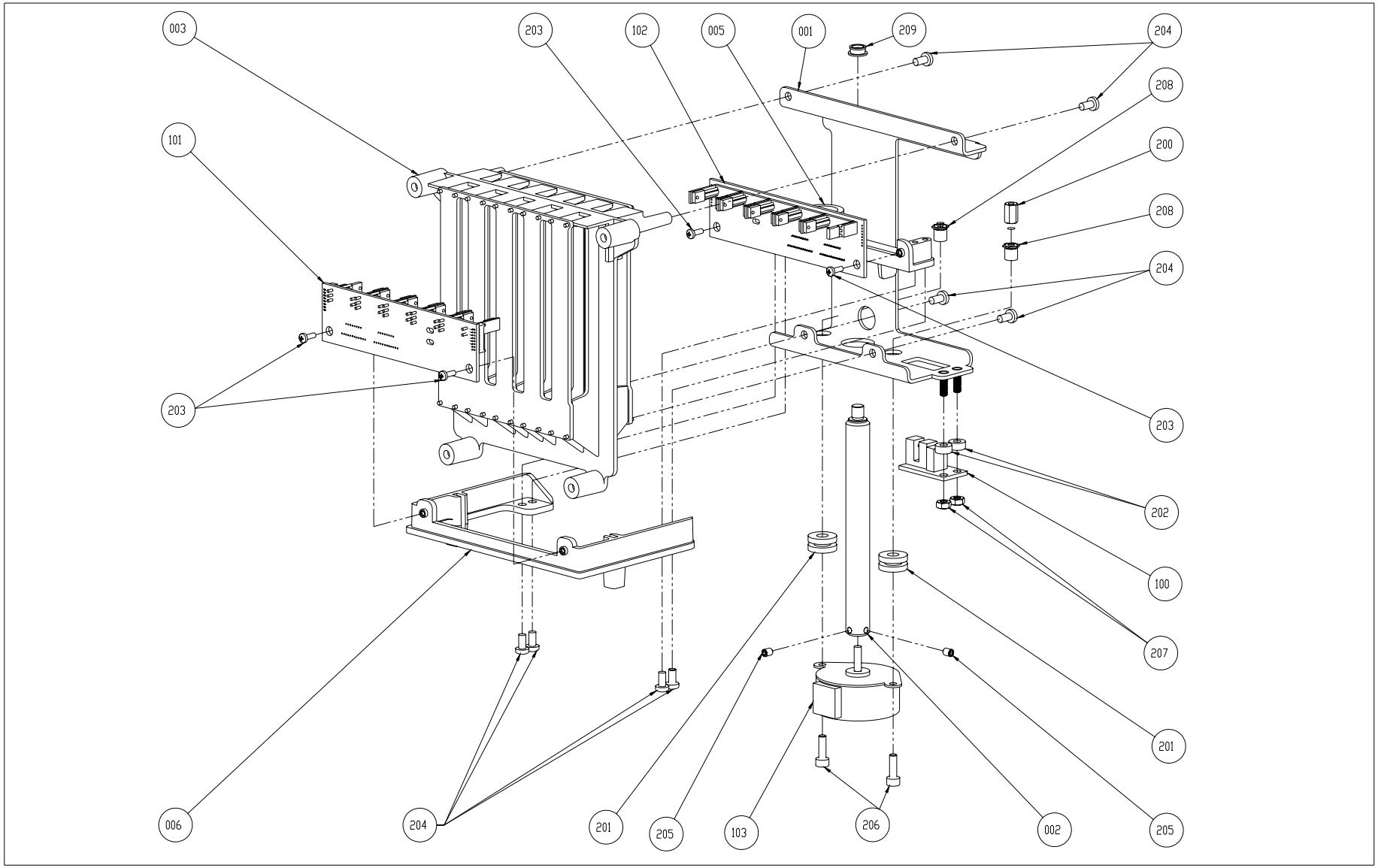
Ref.	Code	Description	Remarks
001	30208610	COMPLETE REAR PANEL	
002	30208600	COMPLETE FRONT PANEL	
003	10341620	PRINTER REVOLVING BRACKET	
004	30208220	ANALYSIS HANDLING UNIT	
005	30208230	VES-MATIC 10 PRINTER UNIT	
006	10602160	UPPER LID	
007	10602170	LOWER LID	
100	30119870	VES-MATIC 10 CPU BOARD	
101	30120010	VES-MATIC 10 CONNECTION BOARD	
102	30120790	VES-MATIC 10 CPU-SENSOR WIRING	Ref.403 (6.4.)
103	30120800	VES-MATIC 10 CPU-INTERCONN. WIRING.	Ref.405 (6.4.)
104	30120811	VES-MATIC 10 PRINTER POWER SUPPLY WIRING	Ref.406 (6.4)
105	30120821	VES-MATIC 10 SERIAL PRINTER WIRING	Ref.404 (6.4.)
200	1110009Z	STEAB 5015/4/1//16 WASHER	
201	1110H85Z	TC ECO-SYN BN 82428 3x8 xTERMOPL. SCREWS	
202	1110H90Z	TC ECO-SYN BN 82428 3x12 xTERMOPL. SCREWS	
203	1110H95Z	LB-5 RICHCO TIGHTENING BUTTON	
204	11141184	M3X8 UNI 5931 STAINLESS STEEL SCREWS	
205	20920010	PAND.ABMM-AT/RICH.FTH-05A-RT AUTOAD. BASE	
206	20920140	TY-RAP 2,4x92mm RICH.WIT-E-18R FASCIA	

List of Accessories & Optionals

Ref.	Code	Description	Remarks
//	12300000	H.MM L=57 D=50 ROLL OF THERMAL PAPER	
//	21890360	USB 1.1 A-B M/M 1.5mt CABLE	
//	30300750	VES-MATIC 10 PACKAGING KIT	
//	30402840	MATSUYAMA POWER SUPPLY UNIT FOR VES-MATIC 10	
//	30600470	VES-MATIC 10 – OPERATING MANUAL IN ENGLISH	
//	30650020	VES-MATIC 10 CD	
//	20550510	Z-3080R9 BARCODE READER + CABLE CAB 50607	Optional

6.2. ANALYSIS HANDLING UNIT- (30208220)

Exploded drawing

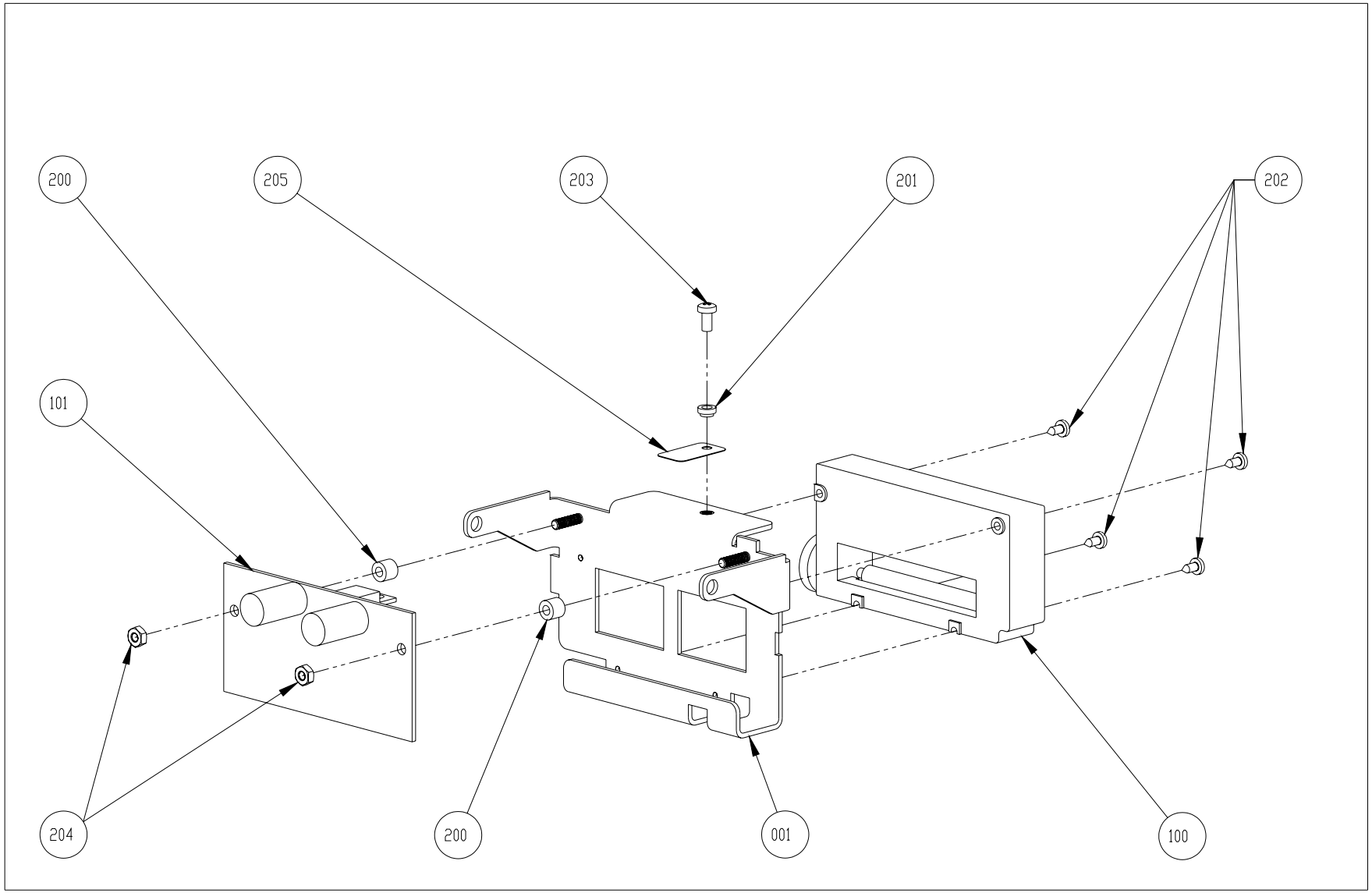


Component list

Ref.	***Code***	***Description***	***Remarks***
001	10341610	ANALYSIS STAND	
002	10341730	ANALYSIS UNIT SCREWS	
003	30208620	ASSEMBLED TEST TUBE STAND	
005	10602200	REAR READER STAND	
006	10602210	FRONT READER STAND	
100	30111640	WIRED PHOTOCELL BOARD	Ref.401 (6.4.)
101	30119990	VES-MATIC 10 FRONT SENSOR READER BOARD	
102	30120000	VES-MATIC 10 REAR SENSOR READER BOARD	
103	30120740	WIRED VES-MATIC 10 MOTOR	Ref.402 (6.4.)
104	30120780	VES-MATIC 10 SENSOR WIRING JUNCTION	Ref.400 (6.4.)
200	1110L05Z	F-F M3x7 E.ZUB. DD10E305007 HEXAGONAL SPACER	
201	1110L02Z	E.ZUBEHOR 486RUBBER FAIRLEAD	
202	1110F56Z	STEAB 5021/3////06 SPACER	
203	1110H87Z	TC ECO-SYN BN 82428 2,5x6 xTERMOPL. SCREWS	
204	1110H90Z	TC ECO-SYN BN 82428 3x12 Xtermopl. SCREWS	
205	11141156	M3X4 UNI 5923 STAINLESS STEEL SCREWS	
206	11141194	M3X10 UNI 5931 STAINLESS STEEL SCREWS	
207	1114473L	M3 UNI 5588 STAINLESS STEEL NUT	
208	1110L03Z	PTSO-S-M3-6 THREADED INSERT	
209	11505420	IGLIDUR MCM-05-02 CLIP BUSHING	
210	20920140	TY-RAP 2,4x92mm RICH.WIT-E-18R FASCIA	

6.3. VES MATIC 10 PRINTER UNIT (30208230)

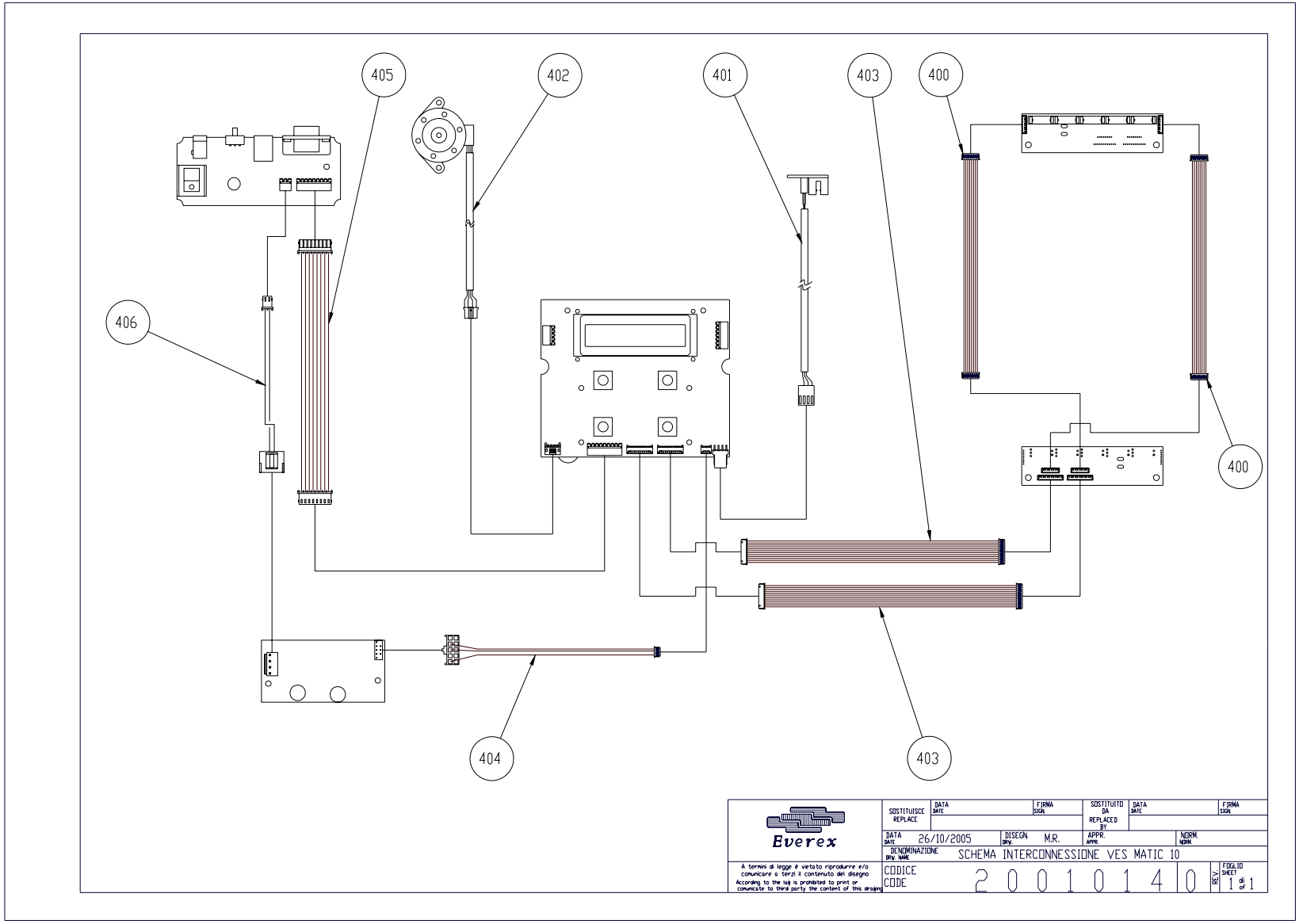
Exploded drawing



Component list

Ref.	Code	Description	Remarks
001	10341630	PRINTER STAND	
100	21430120	STAMP.PANAS.EPL-1902S2AE(PAN-MEC000200)	
101	30111340	SMALL WT01 PRINTER BOARD	
200	1110F56Z	STEAB 5021/3////06 SPACER	
201	1110082Z	TO220 STEAB 5160/12//118 ELMI EM39 ISOLATOR	
202	1110383G	PZAB 2.2X6.5 UNI 6954 ZN SCREWS	
203	11141172	M3X6 UNI 7687 STAINLESS STEEL SCREWS	
204	1114473L	M3 UNI 5588 STAINLESS STEEL NUT	
205	20410020	ISOLATOR FOR TO220 IN MICA	

6.4. INTERCONNECTION DIAGRAM/ ELECTRICAL CONNECTIONS LAYOUT



Component list: WIRING

Ref.	***Code***	***Description***	***Remarks***
400	30120780	VES-MATIC 10 SENSOR JUNCTION WIRING	
401	30111640	WIRED PHOTOCELL BOARD	
402	30120740	WIRED VES-MATIC 10 MOTOR	
403	30120790	VES-MATIC 10 CPU-SENSOR WIRING	
404	30120821	VES-MATIC 10 SERIAL PRINTER WIRING	
405	30120800	VES-MATIC 10CPU-INTERCONN. WIRING	
406	30120811	VES-MATIC 10 PRINTER POWER SUPPLY WIRING	

CHAPTER 7

ELECTRICAL DIAGRAMS AND BOARD LAYOUTS **45**

7.1. VES MATIC 10 CPU BOARD 46
Layout Code 30119870 46
Electrical diagram Code 20103291 (Total pages 4) 47
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Layout Code 30120010 51
Electrical diagram CODE 20103310 52
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Layout Code 30119990 53
Layout Code 30120000 54
Electrical diagram Code 20103300 55
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Layout code 30111640 56
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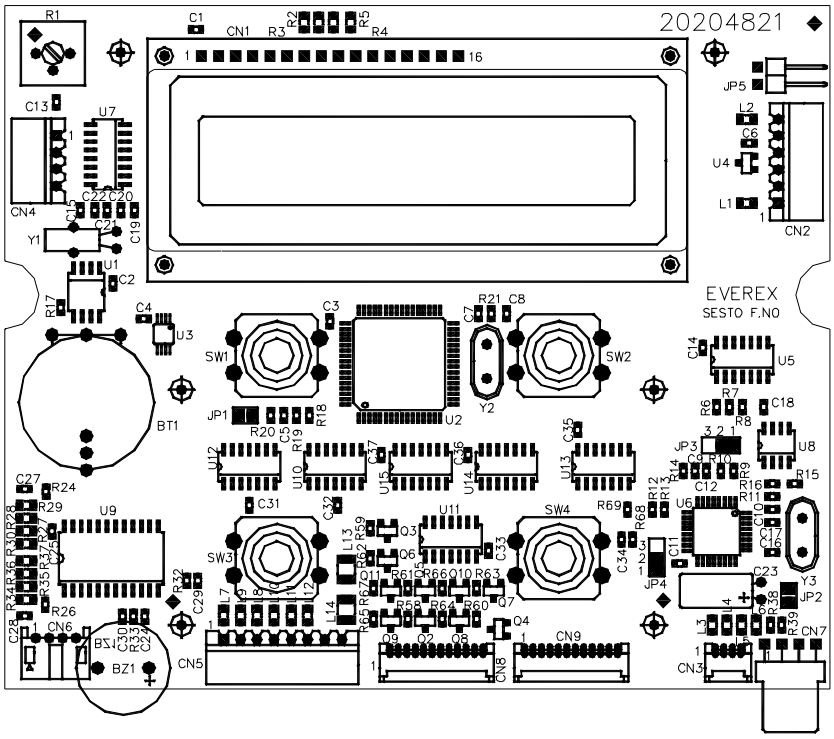
Layout CODE 30111340 57
Electrical diagram CODE 20102462 58

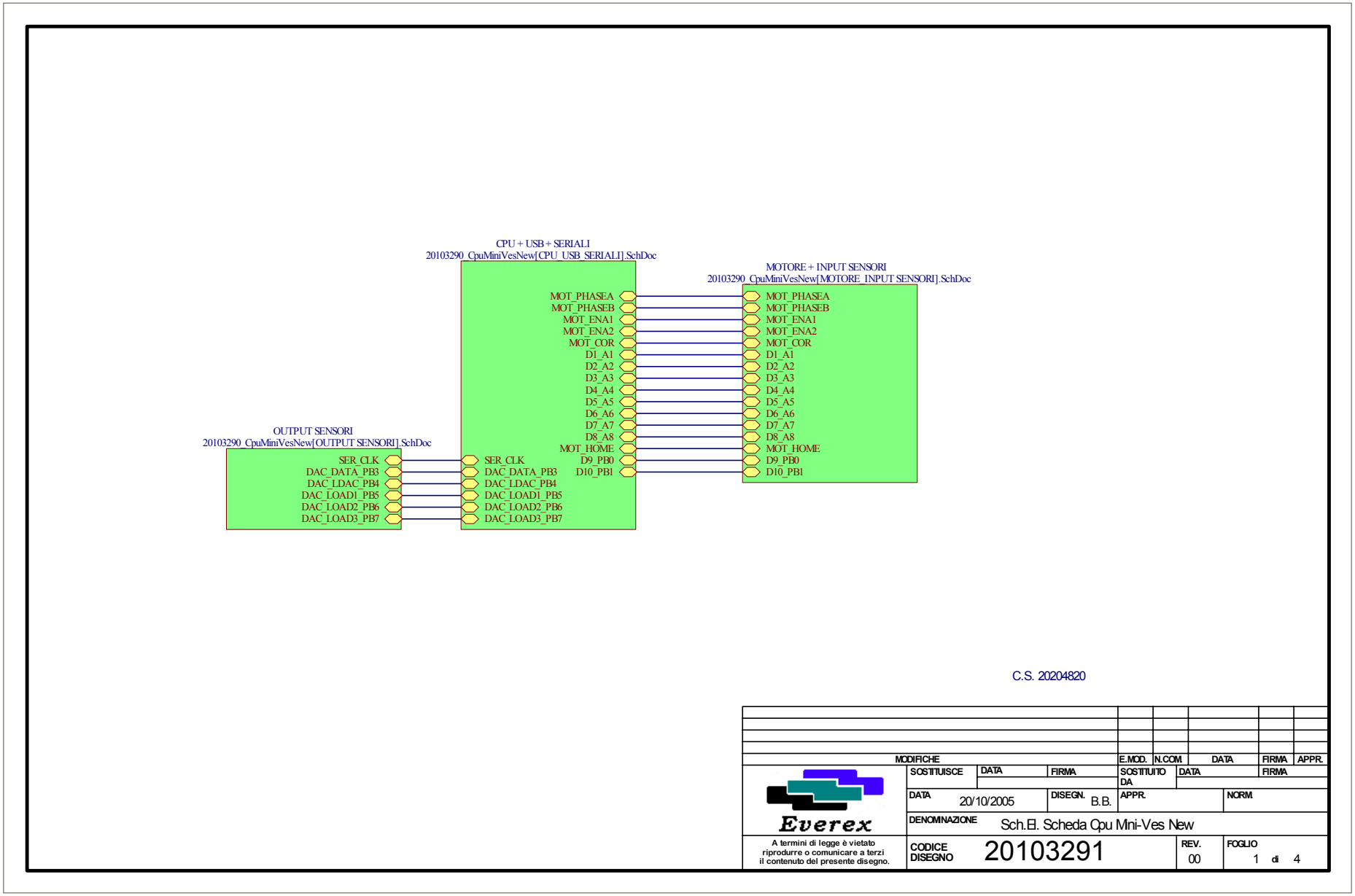
7.1. VES MATIC 10 CPU BOARD

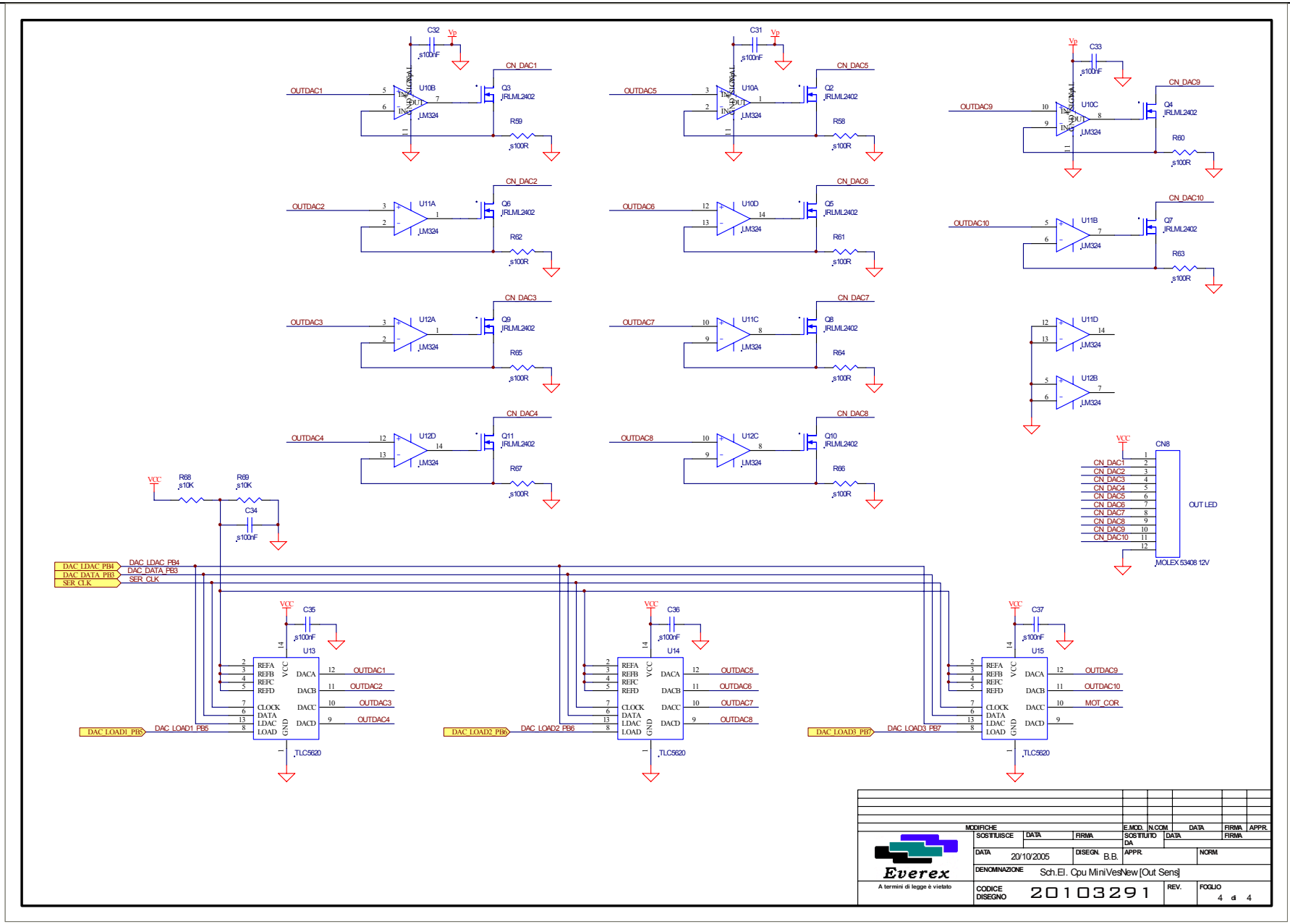
Layout Code 30119870

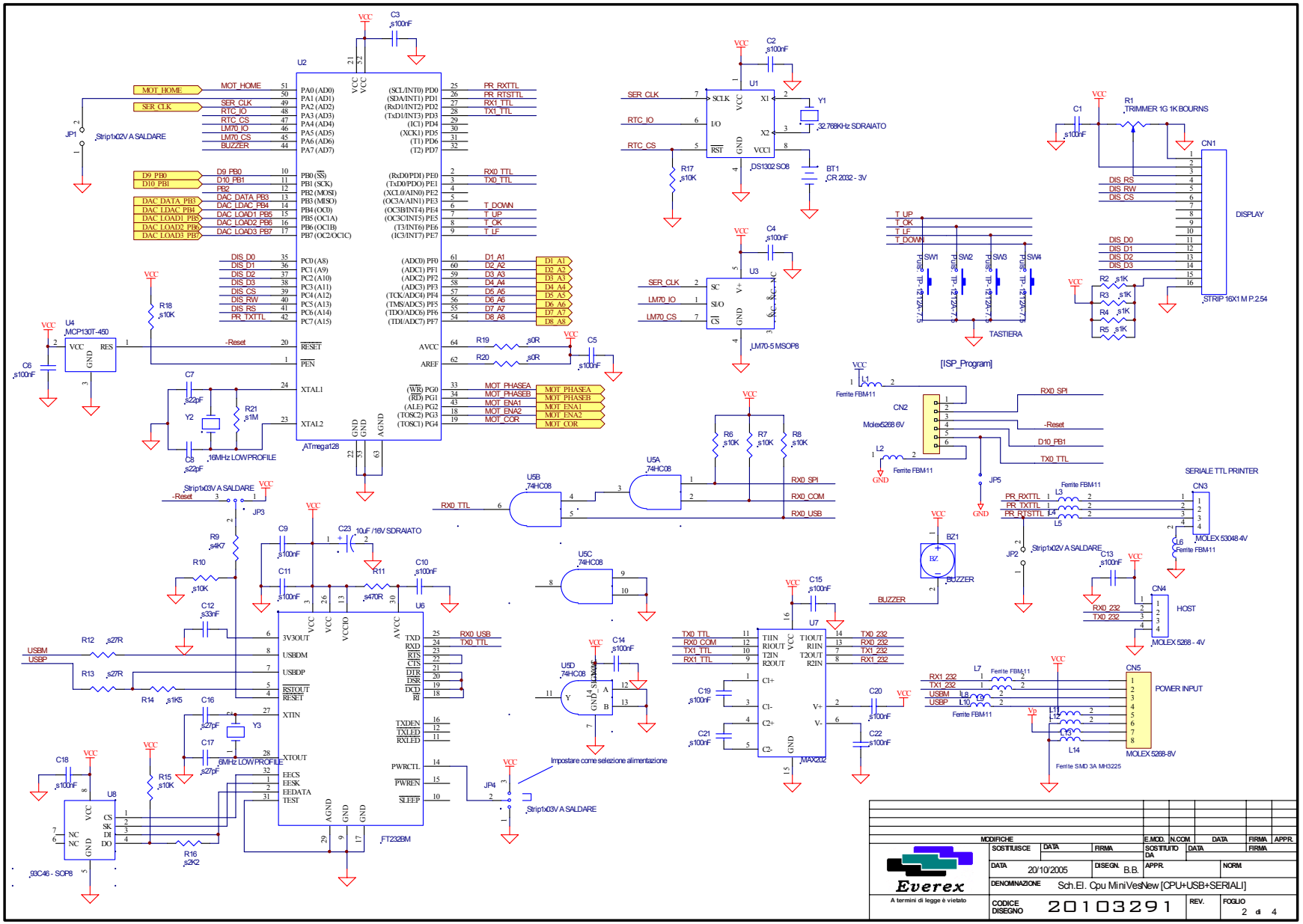


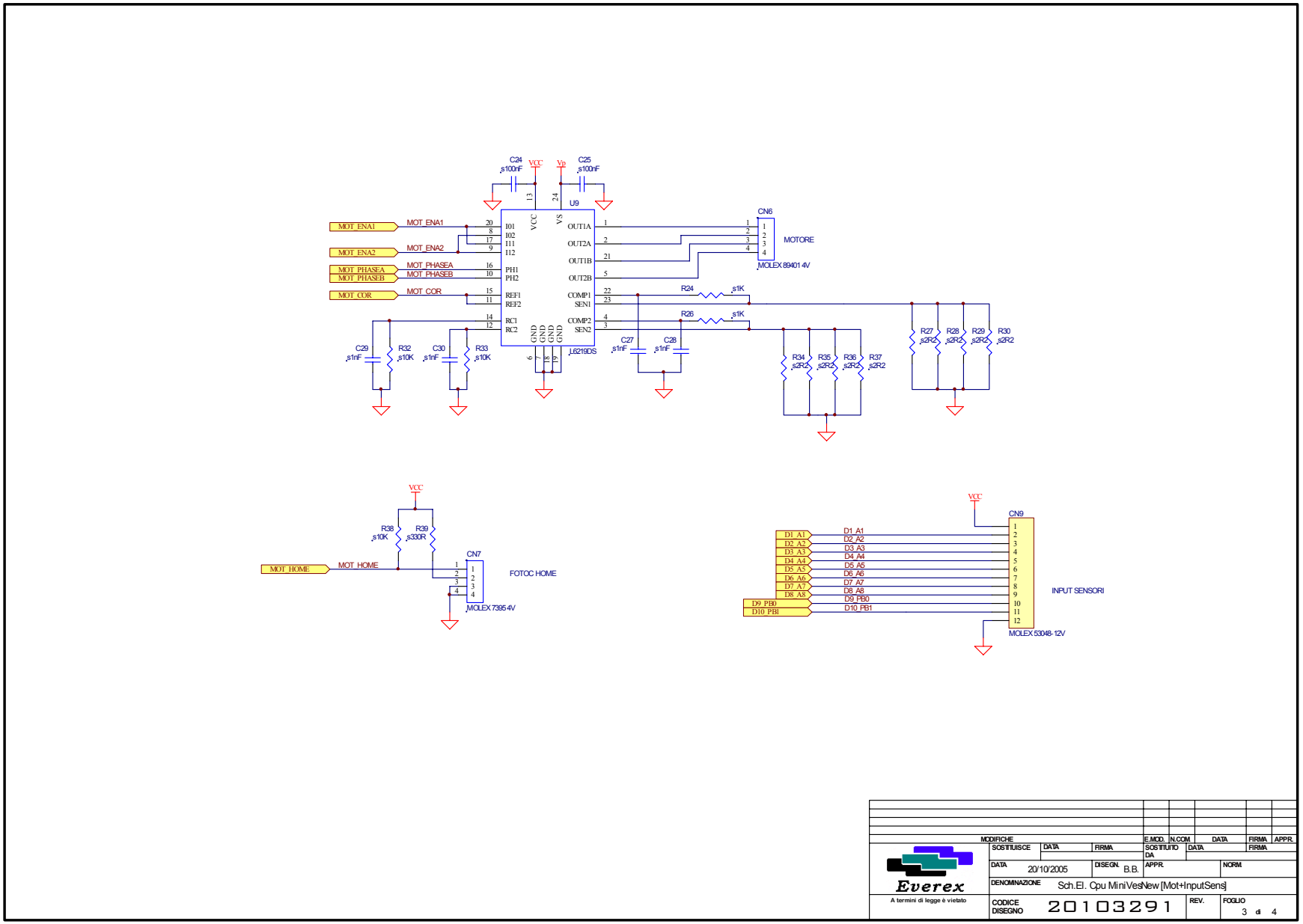
MODIFICHE							
	1	AGGIORNATA DOPO IL COLLAUDO			06.07.05	SCM	
LAVAGGIO:		RASATURA h=	E.MOD.	N.COM.	DATA	FIRMA	APPR.
	SCALE: 1:1	MATERIALE	FINITURA				
		SPESS. Cu	TRATT.				
EVEREX		SOSTITUISCE DATA / FIRMA	SOSTITUITO DA DATA / FIRMA				
		DATA 18.05.2005	DIS. STUDIO CAD MASTER	APPR.	NORM.		
		DENOM. SCHEDA CPU VES MATIC 10					
A TERMINE DI LEGGE E' VIETATO RIPRODURRE O COMUNICARE A TERZI IL CONTENUTO DEL PRESENTE DISEGNO		CODICE DISEGNO 30119870	REV. 0	FILE	FOGLIO 1 DI 1		

Electrical diagram Code 20103291 (Total pages 4)



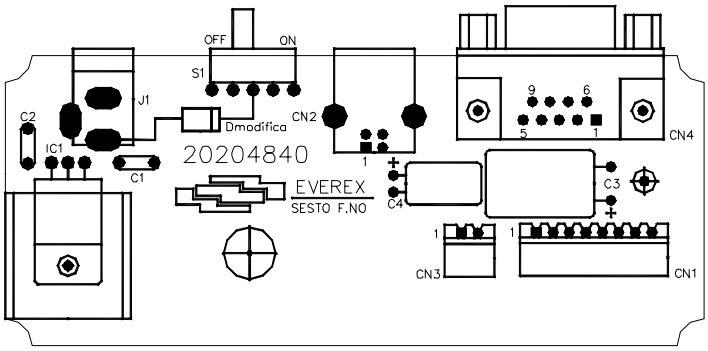

C32
Vp
,s100nF
CN_DAC1
OUTDAC1
U10B
Q3
JRLML2402
LM324
R59
,s100R
C31
CN_DAC5
OUTDAC5
U10A
Q2
R58
C33
CN_DAC9
OUTDAC9
U10C
Q4
R60
CN_DAC2
OUTDAC2
U11A
Q6
R62
CN_DAC6
OUTDAC6
U10D
Q5
R61
CN_DAC10
OUTDAC10
U11B
Q7
R63
CN_DAC3
OUTDAC3
U12A
Q9
R65
CN_DAC7
OUTDAC7
U11C
Q8
R64
U11D
U12B
CN_DAC4
OUTDAC4
U12D
Q11
R67
CN_DAC8
OUTDAC8
U12C
Q10
R66
VCC
R68
,s10K
R69
,s10K
C34
CN8
OUT LED
MOLEX 53408 12V
DAC_LDAC_PB4
DAC_DATA_PB3
SER_CLK
C35
C36
C37
U13
U14
U15
REFA
REFB
REFC
REFD
CLOCK
DATA
LDAC
LOAD
VCC
GND
DACA
DACB
DACC
DACD
OUTDAC1
OUTDAC2
OUTDAC3
OUTDAC4
OUTDAC5
OUTDAC6
OUTDAC7
OUTDAC8
OUTDAC9
OUTDAC10
MOT_COR
TLC5620
DAC_LOAD1_PB5
DAC_LOAD2_PB6
DAC_LOAD3_PB7
MODIFICHE
SOSTITUISCE
DATA
FIRMA
E.MOD.
N.COM
SOSTITUITO
Everex
A termini di legge è vietato
DATA 20/10/2005
DISEGN. B.B.
APPR.
NORM
DENOMINAZIONE Sch.El. Cpu MiniVesNew [Out Sens]
CODICE DISEGNO 20103291
REV.
FOGLIO 4 di 4


U2
ATmega128
U1
DS1302 SO8
Y1
32.768KHz SDRAIATO
BT1
CR 2032 - 3V
U3
LM70-5 MSOP8
U4
MCP130T-450
U5A
74HC08
U5B
74HC08
U5C
74HC08
U5D
74HC08
U6
FT232BM
U7
MAX202
U8
93C46 - SOP8
JP1
Strip1x02V A SALDARE
JP2
Strip1x02V A SALDARE
JP3
Strip1x03V A SALDARE
JP4
Strip1x03V A SALDARE
JP5
Impostare come selezione alimentazione
Y2
16MHz LOWPROFILE
Y3
6MHz LOWPROFILE
SW1
SW2
SW3
SW4
TASTIERA
DISPLAY
STRIP 16X1 M P.254
CN1
CN2
Molex5268 6V
CN3
MOLEX 53048 4V
CN4
HOST
MOLEX 5268 - 4V
CN5
POWER INPUT
MOLEX 5268-8V
BZ1
BUZZER
[ISP_Program]
SERIALE TTL PRINTER
Ferrite FBM11
Ferrite SMD 3A MH3225
TRIMMER 1G 1K BOURNS
-Reset
RX0_SPI
RX0_COM
RX0_USB
TX0_TTL
RX0_232
TX0_232
RX1_232
TX1_232
PR_RXTTL
PR_TXTTL
PR_RTSTTL
T_UP
T_OK
T_LF
T_DOWN
DIS_RS
DIS_RW
DIS_CS
DIS_D0
DIS_D1
DIS_D2
DIS_D3
MOT_HOME
SER_CLK
RTC_IO
RTC_CS
LM70_IO
LM70_CS
BUZZER
USBM
USBP
MODIFICHE
SOSTITUISCE
DATA
FIRMA
E.MOD.
N.COM
SOSTITUITO
DA
APPR.
NORM
DISEGN. B.B.
DENOMINAZIONE Sch.El. Cpu MiniVesNew [CPU+USB+SERIALI]
CODICE DISEGNO 20103291
REV.
FOGLIO 2 di 4
Everex
A termini di legge è vietato


C24 ,s100nF
VCC
Vp
C25 ,s100nF
U9
MOT_ENA1
MOT_ENA2
MOT_PHASEA
MOT_PHASEB
MOT_COR
I01
I02
I11
I12
PH1
PH2
REF1
REF2
RC1
RC2
VCC
VS
GND
OUT1A
OUT2A
OUT1B
OUT2B
COMP1
SEN1
COMP2
SEN2
L6219DS
CN6
MOTORE
MOLEX 89401 4V
R24 ,s1K
R26 ,s1K
C29 ,s1nF
R32 ,s10K
C30 ,s1nF
R33 ,s10K
C27 ,s1nF
C28 ,s1nF
R27 ,s2R2
R28 ,s2R2
R29 ,s2R2
R30 ,s2R2
R34 ,s2R2
R35 ,s2R2
R36 ,s2R2
R37 ,s2R2
R38 ,s10K
R39 ,s330R
MOT_HOME
CN7
FOTOC HOME
MOLEX 73954V
D1_A1
D2_A2
D3_A3
D4_A4
D5_A5
D6_A6
D7_A7
D8_A8
D9_PB0
D10_PB1
CN9
INPUT SENSORI
MOLEX 53048-12V
MODIFICHE
SOSTITUISCE
DATA
FIRMA
E.MOD.
N.COM
SOSTITUITO
Everex
A termini di legge è vietato
DATA 20/10/2005
DISEGN. B.B.
APPR.
NORM
DENOMINAZIONE Sch.El. Cpu MiniVesNew [Mot+InputSens]
CODICE DISEGNO 20103291
REV.
FOGLIO 3 di 4

7.2. VES MATIC 10 CONNECTION BOARD

Layout Code 30120010



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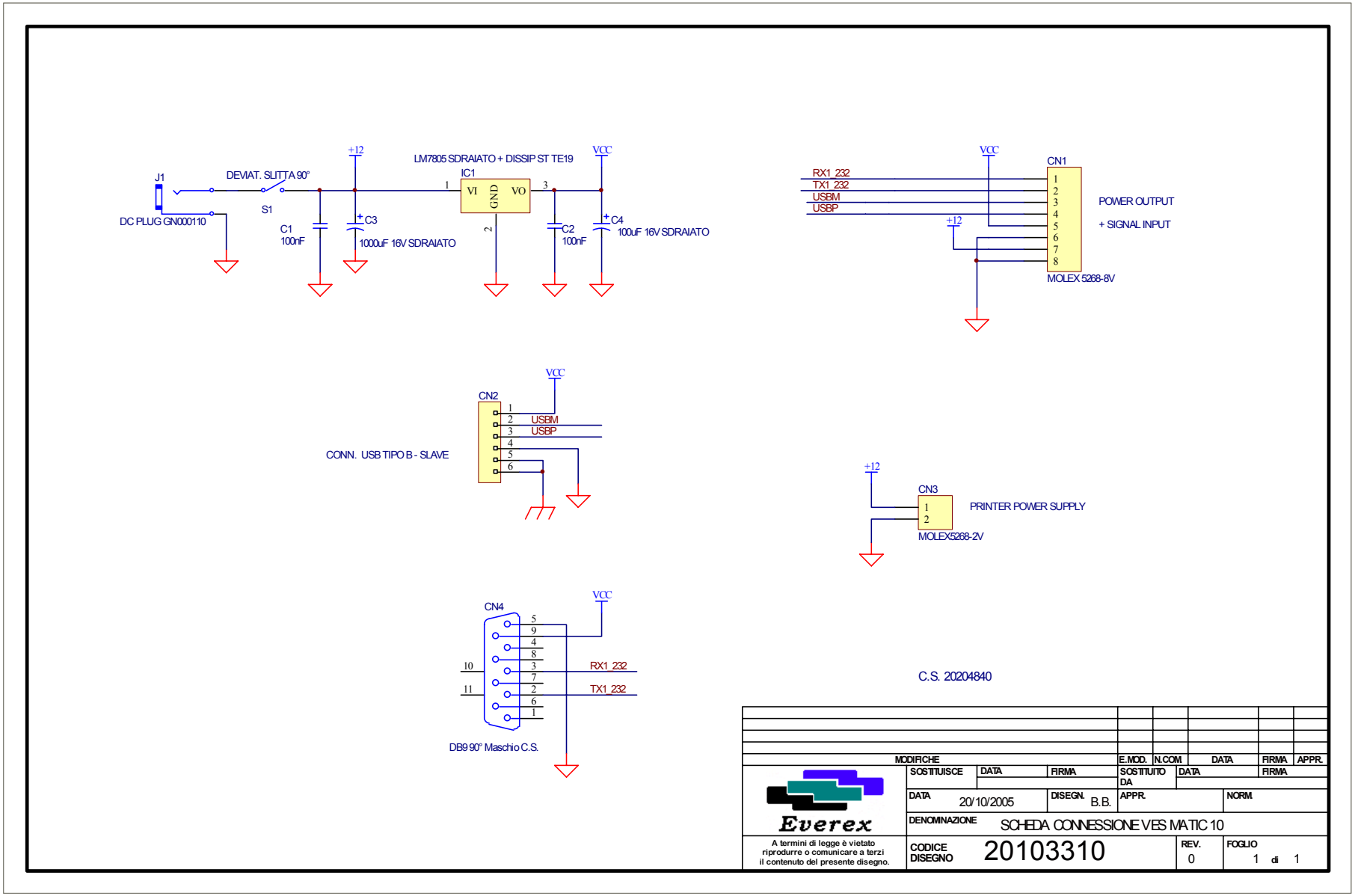
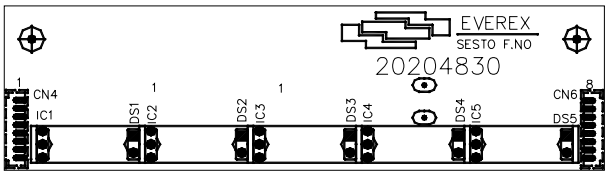
SCALE: 1:1	MATERIALE			FINITURA				
	SPESS. Cu			TRATT.				
EVEREX	SOSTITUISCE	DATA	FIRMA	SOSTITUITO DA	DATA			
					FIRMA			
	DATA 25.05.2005	DIS. STUDIO CAD MASTER	APPR.	NORM.				
	DENOM. SCHEDA CONNESSIONI VES MATIC 10							
A TERMINE DI LEGGE E' VIETATO RIPRODURRE O COMUNICARE A TERZI IL CONTENUTO DEL PRESENTE DISEGNO	CODICE DISEGNO 30120010	REV. 0	FILE	FOGLIO 1 DI 1				

Electrical diagram CODE 20103310



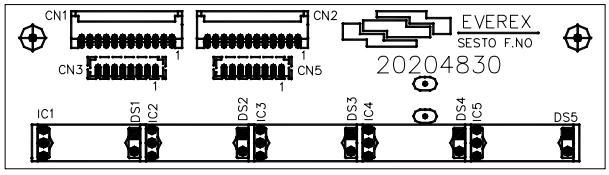
7.3. VES MATIC 10 FRONT/REAR READ SENSOR BOARD

Layout Code 30119990



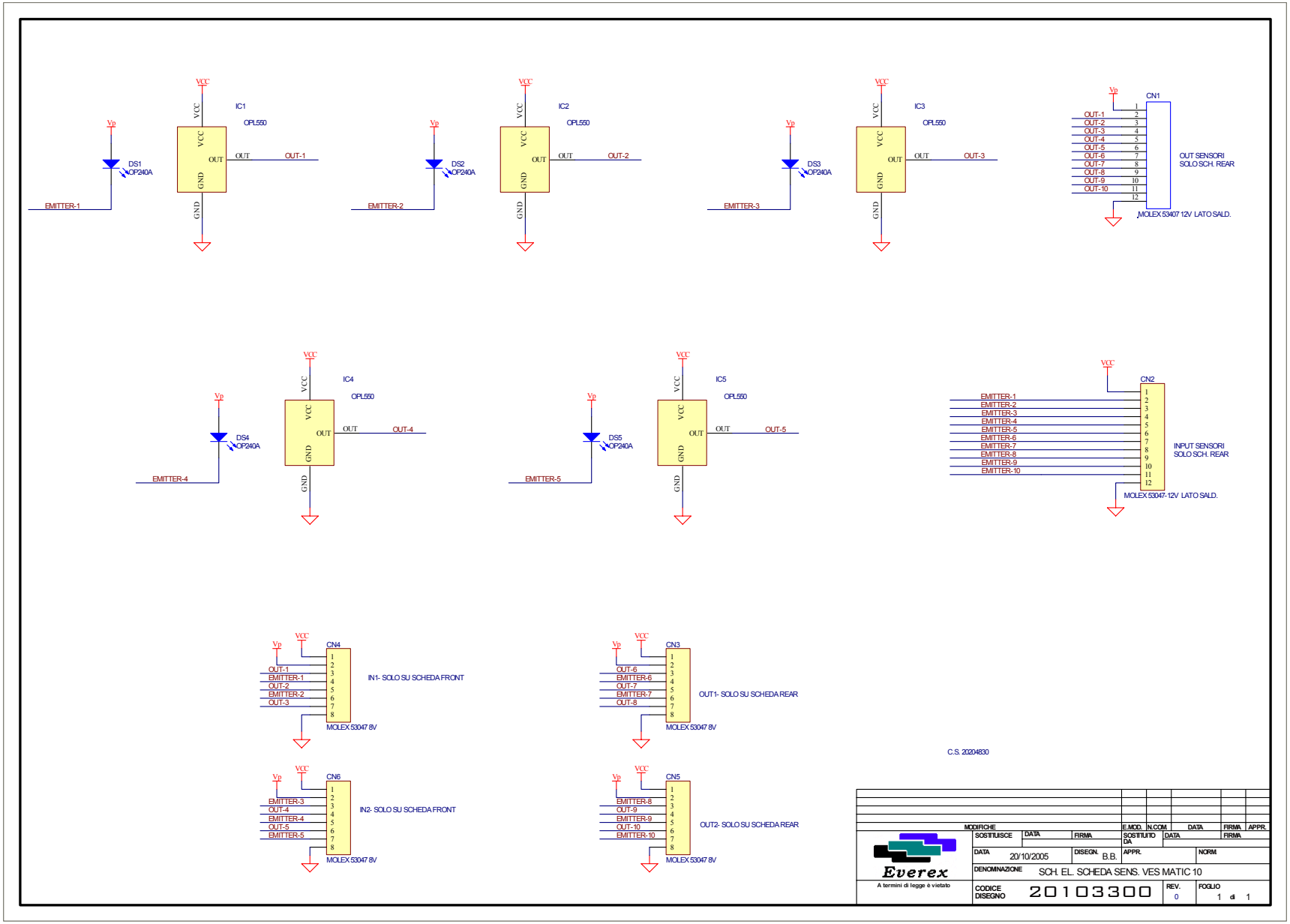
MODIFICHE							
LAVAGGIO:	RASATURA h=		E.MOD.	N.COM.	DATA	FIRMA	APPR.
SCALE: 1:1	MATERIALE		FINITURA				
	SPESS. Cu		TRATT.				
EVEREX	SOSTITUISCE	DATA / FIRMA	SOSTITUITO DA	DATA / FIRMA			
	DATA 24.05.2005	DIS. STUDIO CAD MASTER	APPR.	NORM.			
	DENOM. SCH. SENSORI LETTURA VES-MATIC 10 ANTERIORE						
A TERMINE DI LEGGE E' VIETATO RIPRODURRE O COMUNICARE A TERZI IL CONTENUTO DEL PRESENTE DISEGNO	CODICE DISEGNO 30119990	REV. 0	FILE 20204830. SE	FOGLIO 4 DI 5			

Layout Code 30120000



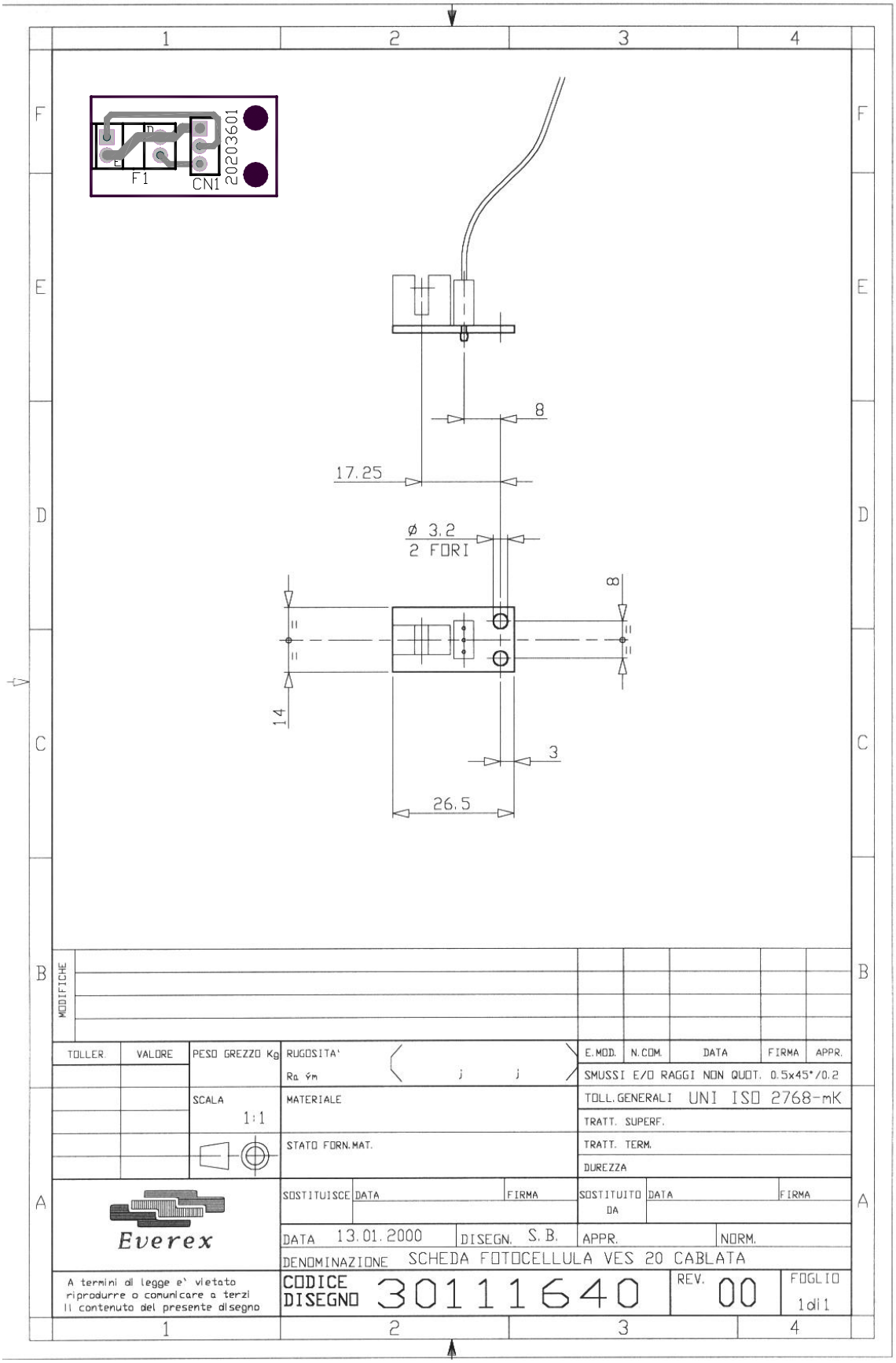
MODIFICHE								
LAVAGGIO:	RASATURA h=			E.MOD.	N.COM.	DATA	FIRMA	APPR.
SCALE: 1:1	MATERIALE			FINITURA				
	SPESS. Cu			TRATT.				
EVEREX	SOSTITUISCE	DATA	FIRMA	SOSTITUITO DA	DATA			
					FIRMA			
	DATA 24.05.2005	DIS. STUDIO CAD MASTER		APPR.		NORM.		
	DENOM. SCH. SENSORI LETTURA VES-MATIC 10 POSTERIORE							
A TERMINE DI LEGGE E' VIETATO RIPRODURRE O COMUNICARE A TERZI IL CONTENUTO DEL PRESENTE DISEGNO	CODICE DISEGNO 30120000	REV. 0	FILE 20204830. SE	FOGLIO 4 DI 5				

Electrical diagram Code 20103300



7.4. WIRED PHOTOCELL BOARD

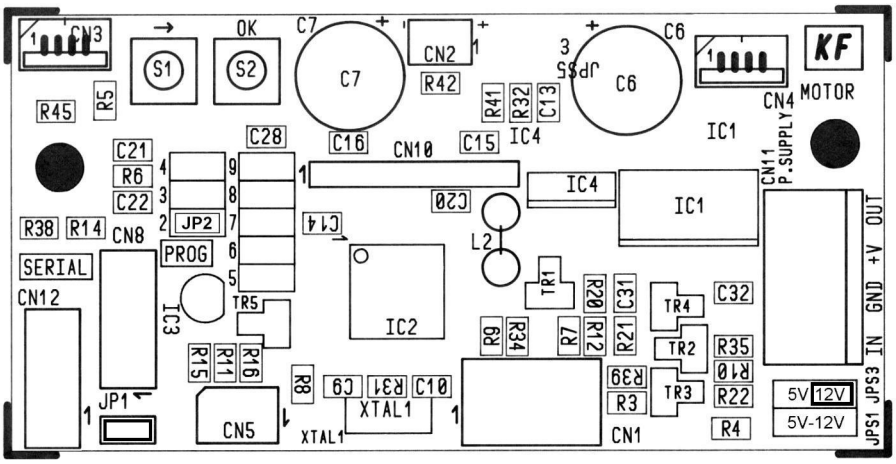
Layout code 30111640



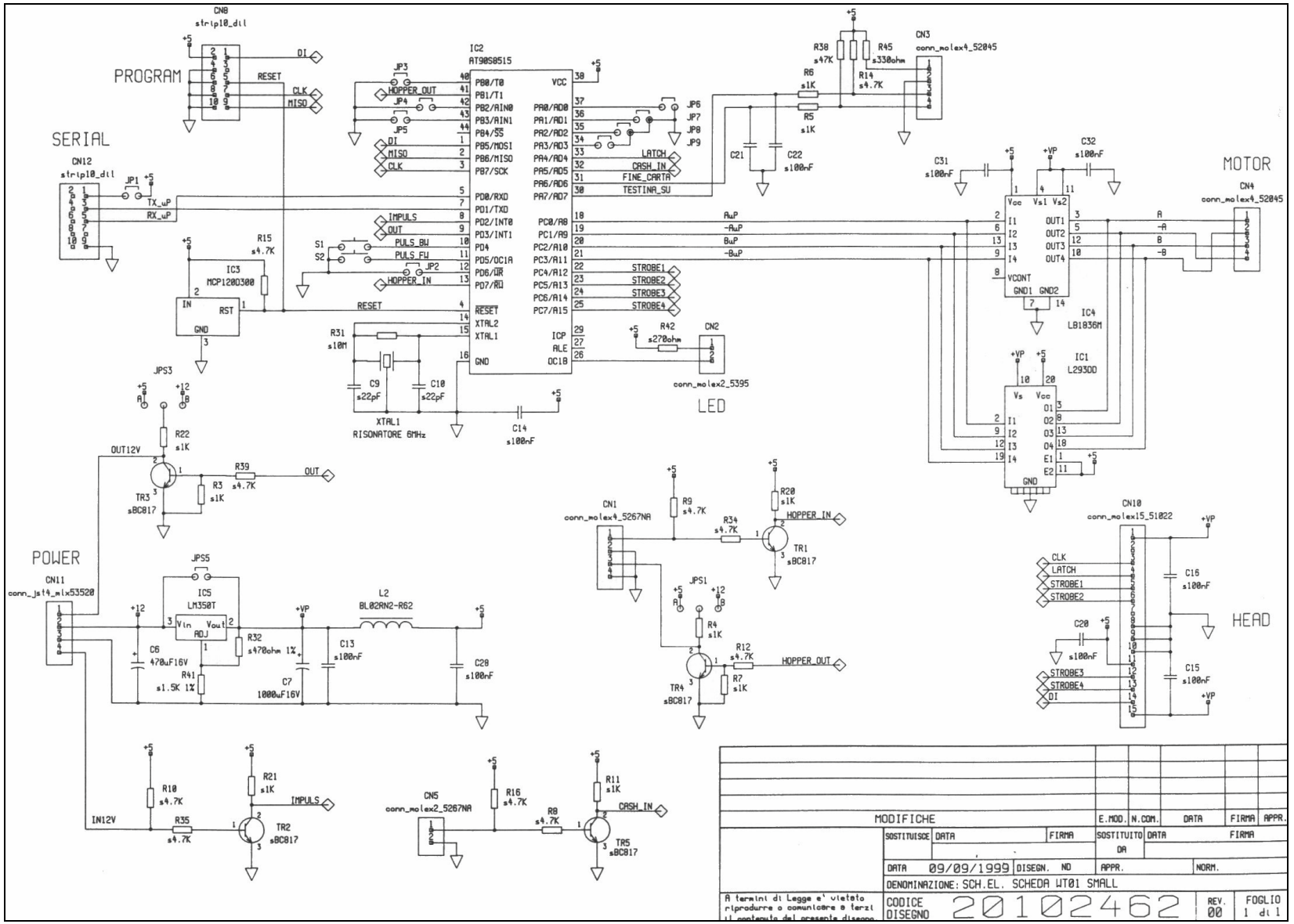
7.5. BOARD PRINTER WT01 SMALL

Layout CODE 30111340

EVEREX CARTOUCHE



Electrical diagram CODE 20102462



ATTACHMENT A: EXTERNAL CONNECTIONS

1. GENERAL SPECIFICATIONS FOR CONNECTING TO A BARCODE READER A-2
2. GENERAL SPECIFICATIONS FOR CONNECTION TO A HOST COMPUTER A-3
3. SPECIFICATIONS OF THE ASYNCHRONOUS SERIAL COMMUNICATION PROTOCOL A-3
4. VES10 SERIAL COMMANDS AND PARAMETER FORMAT A-4

The cables used for the external connections must not exceed 3 metres in length.

1. GENERAL SPECIFICATIONS FOR CONNECTING TO A BARCODE READER

Before connecting the external barcode reader it is recommended checking that:

a. This is fitted with a cable with a DB9 female connector in DTE set-up with a 5Vdc 9-pin power supply (refer to the instruction manual of the barcode reader),

b. The signals on the DB9 female connector are compatible with the connector installed on the rear of the instrument to which it is connected:

DB9 Male "EXTERNAL BARCODE" on system rear	
PIN	SIGNAL
2	[Tx] Data transmission towards the reader (not used)
3	[RX] Date received from the reader
5	GND
9	+ 5 V

TECHNICAL INFORMATION:

- The electrical levels of the signals are of the standard RS232 type.
- The communication is one-way from the barcode reader towards the machine.
- The speed of the transmission is 9600 bit/s; the data format is of the type with 8 data bits, 1 stop bit and no parity bit.
- The communication protocol is of the ASCII type; the barcode read must be terminated with the Carriage Return (0x0d).

1. Connect the instrument to the external barcode.
   Use the Barcode Model *Z-3080* [Zebex] (or equivalent) with a connection cable type *CAB 50607-R9* [Zebex] (or equivalent).

2. GENERAL SPECIFICATIONS FOR CONNECTION TO A HOST COMPUTER

It is possible to connect the VESMATIC 10 to a Host Computer via the USB interface, installed on the rear of the instrument.

For connection, use the standard USB cable ['USB 1.1 A-B M/M CABLE' type] supplied with the system. The system is also supplied with a CD-ROM that contains USB drivers for Windows XP and the instructions for installation [Order Code: 22100210] to configure the PC's serial USB port.

WARNING:
In case of any communication problem with the host, check that the COM ID is the same that has been assigned upon installation (sometimes new addresses are assigned to PC ports during subsequent hardware installations).

For the configuration of the hardware of the ID address of the instrument refer to paragraph 3.1.10.

3. SPECIFICATIONS OF THE ASYNCHRONOUS SERIAL COMMUNICATION PROTOCOL

A bi-directional serial communication protocol called "NewProtocol" is installed on the VESMATIC 10 instrument (described in the following section).

Representation of the transit bytes on the serial:

STX	BLK	BLK	LEN	LEN	ADD	ADD	COM	COM	D1	...	Dn	ETX	CHK	CHK

Each box represents 1 byte that transits on the serial port, while the pair of bytes will be packed in the memory, meaning that they will return to being 1 byte.

STX : ASCII '>' 0x3E character
BLK : Block number, always = '00' unless for multi-block transferrals (see command 03)

LEN : Number of characters from D1 to Dn inclusive

ADD : ID device (00 and FF = Reserved) Range available 01-7F

COM : ID command

If COM=COM+0x80 the end of the block is given by ETX and CHK is not controlled.

D1.Dn : Date relating to the command

ETX : ASCII 'CR' 0x0D Character

CHK : CheckSum (XOR from STX to Dn inclusive)

The response to the protocol must come from the receiving device:

ACK / NAK	ADD	ADD	ETX

ACK : ASCII 0x06 character
If the command block has been correctly interpreted according to the protocol specifications

NAK : ASCII 0x15 character
If the command block fails to comply with the protocol specifications

ADD : ID device

In the case of the translation of the data making the use of additional blocks necessary these will be numbered in an increasing order starting from 0, moreover, every transmission with additional blocks must finish with the block with a length of nil.

4. VES10 SERIAL COMMANDS AND PARAMETER FORMAT

Every command interpreted obtains as a response 'ACK'=[0x06]+ID+CR
In the case of a syntax error or an incorrect command the response will be 'NACK'=[0x15]+ID+CR

0x00: Request for version

VesMatic10 responds with an ASCII character string containing the firmware version.

Example of version request to the machine with address 0x00 without checksum verification.

Example:

From Host

>00000080+CR+00 The machine with ID '00' is requested to execute command '80' (that is, command '00' without checksum verification)

From VES 10

>00100000SW VERS 1.00B +CR+59

0x02: Command requesting machine status

VesMatic10 responds with a 1-byte message containing machine status information.
If the machine is free, status is 0x00; any other value indicates that the machine is engaged.

Example of machine status request with address 0x00 without checksum verification.

Example:

From Host

>00000082+CR+00 The machine with ID '00' is requested to execute command '0x82' (that is, command '0x02' without checksum verification)

From VES 10

>0002000200+CR+33 *[FREE]*

>00020002FF+CR+33 *[ENGAGED]*

0x13-P: Request for sending of analyses

As a response to this command, the VesMatic10 instrument will send a 160-byte record containing the results of 5 tests.
If parameter P is 0x00, the last 5 tests performed will be sent. If parameter P is 0x01, the 5 previous tests will be sent, and so on. If P is 0x13, the first 5 tests stored in the memory will be sent.
If parameter P exceeds the allowed limits (0x00-0x13), a 1-byte syntax error message (0x01) will be sent in response.

Example of a request for the 5 tests before the last 5, to the machine with address 0x00 without checksum verification and with legal parameter P = 0x01.

Example:

From Host

>0002009301+CR+00 The machine with ID '00' is requested to execute command '93' (that is, command '13' without checksum verification) with parameter '01' indicating the tests requested.

From VES

>00A00013*[see description below-160 bytes]*+CR+XX

Each 32-byte field containing the results of a test includes the following sub-fields:

E-C-PR-P-T-H-M-S-G-M-A-BC-F1-F2-H1-H2-KI-R1-R2-R3

E (1 byte) Validates the content of the whole field, if its value is zero. If its value differs from zero, the remaining bytes in the field have no meaning.

C (1 byte) Test cycle number.

PR (1 byte) Contains Boolean flags describing test execution methods:
Bit 0 at 0 means normal test, 1 random test.
Bit 1 at 0 means one hour test, 1 two hour test.
If the test is a 1 h test, sub-fields H2 and KI have no meaning.
Bit 2 at 0 means temperature correction function is off, 1 temperature correction on.

Bit 3 at 0 means barcode off, 1 barcode on.
Bit 4 at 0 means display off, 1 display on.
Bit 5 at 0 means printer off, 1 printer on.
Bit 6 at 0 means normal print, 1 reverse print.
Bit 7 at 0 means quality control off, 1 quality control on.

P (1 byte) Position where the tests was performed.

T (1 byte) Test temperature.

H (1 byte) Test time.

M (1 byte) Test minute.

S (1 byte) Test second.

G (1 byte) Test day.

ME (1 byte) Test month.

A (1 byte) Test year.

BC (13 byte) Bar code characters.

F1 (1 byte) Contains Boolean flags describing test results.

Bit 0 set means error in one sensor.
Bit 1 set means no cuvette in.
Bit 2 set means HIGH sample.
Bit 3 set means LOW sample.
Bit 4 set means EMPTY cuvette.
Bit 5 not used.
Bit 6 not used.
Bit 7 set means that one or more previous bits are set.

Note: if one or more bits in sub-field F1 were set, the values shown in fields H1, H2 and KI have no meaning.

F2 (1 byte) Contains Boolean flags describing test results.

Bit 0 set means reading at 2 hours greater than reading at 1 hour (sub-field H1 has no meaning).
Bit 0 set means reading at 2 hours greater than reference reading (sub-fields H2 and KI have no meaning).
Bit 0 set means reading at 1 hour greater than reference reading (sub-field H2 and KI have no meaning).
The other bits are not used.

H1 (1 byte) ESR results at 1 hour.

H2 (1 byte) ESR results at 2 hours.

KI (1 byte) Katz Index result.

R1 (1 byte) Not used.

R2 (1 byte) Not used.

R3 (1 byte) Not used.

IMPORTANT NOTE:

VESMATIC10 responds to commands only when it is not in the engaged status.

BEFORE SENDING THIS COMMAND, SEND COMMAND 0x02 TO MAKE SURE THAT THE VESMATIC10 INSTRUMENT IS IN THE CORRECT CONDITION TO RESPOND.

ATTACHMENT B:
UPGRADE SOFTWARE

(PROGRAMMING MANUAL)

1. INSTALLING THE PROGRAMMING SOTWARE 'WinBootPrg' A-9
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1. INSTALLING THE PROGRAMMING SOTWARE 'WinBootPrg'

The "VESMATIC 10" CD [Order Code: P30650020] supplied with the system contains the programming software 'WinBootPrg' [Order Code: P22100220] to be used to update the application software.
Connect the instrument to the PC using the USB 1.1 A-B M/M connector [Order Code: P21890360] supplied and install the VCP driver on the PC to configure the USB port (see instructions in the CD-ROM).

Accessories required:
Programming the instrument requires a Personal Computer (or a notebook) with Windows®XP operating system and a USB port.
Please, carefully follow the instructions below.

Installation of the WinBootPrg software:

1. Double click the **setup.exe** file in the 22100220_Install WinBootPrg EVEREX srl folder in the CD-Rom to launch the program.

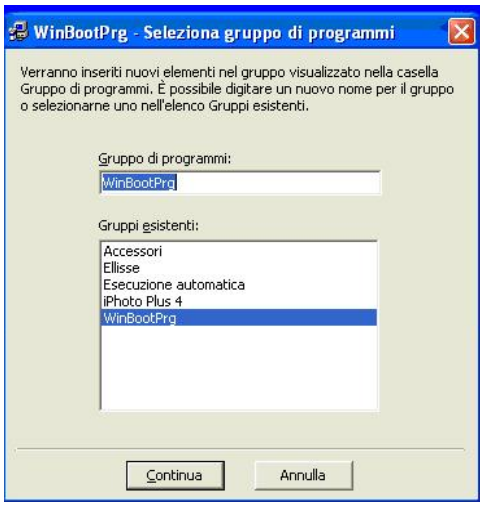
2. Press **OK** to start the installation.

Programma di installazione di WinBootPrg
Programma di installazione di WinBootPrg.
Impossibile installare i file di sistema o aggiornare i file condivisi se questi sono in uso. Prima di continuare, è consigliabile chiudere le eventuali applicazioni in esecuzione.
OK
Esci dall'installazione

3. By default the program is installed in the **c:\Programmi\WinBootPrg** folder (if you want to change its destination, press "Change Directory" and choose the new path); press the Start push-button.

Programma di installazione di WinBootPrg
Fare clic sul pulsante qui sotto per iniziare l'installazione.
Fare clic su questo pulsante per installare il software di WinBootPrg nella directory di destinazione specificata.
Directory:
C:\Programmi\WinBootPrg\
Cambia directory
Esci dall'installazione

4. Confirm the group of Programs highlighted with **Continue**.

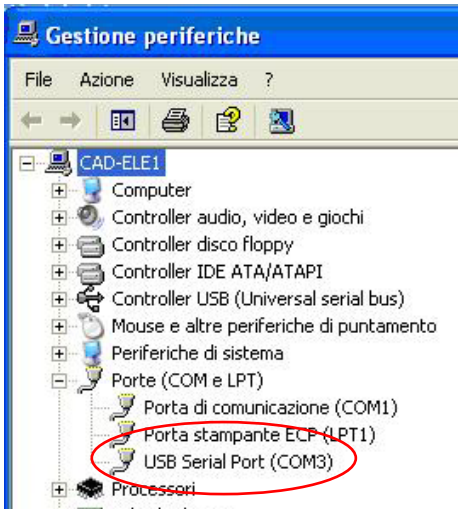

WinBootPrg - Seleziona gruppo di programmi
Verranno inseriti nuovi elementi nel gruppo visualizzato nella casella Gruppo di programmi. È possibile digitare un nuovo nome per il gruppo o selezionarne uno nell'elenco Gruppi esistenti.
Gruppo di programmi:
WinBootPrg
Gruppi esistenti:
Accessori
Ellisse
Esecuzione automatica
iPhoto Plus 4
WinBootPrg
Continua
Annulla

5. When installation is completed, the following message will be displayed '**WinBootPrg installation completed'**; press OK to exit.

2. COPYING THE FILE TO TRANSFER TO THE UNIT

Contact the Support Centre for receiving the update file.

1. Copy the application software file (VesMatic10_SWXXX.hex) to be transferred to the VesMatic 10 system in the **C:\Programmi\ WinBootPrg** folder.
2. Connect the system to the PC and to the power supply mains to ensure that the USB port address [COM_PORT=] in the winbootprg.ini file contained in the WInBootPrg folder corresponds to the USB port address indicated in the system properties [Control panel\System properties\Hardware\Peripheral management].

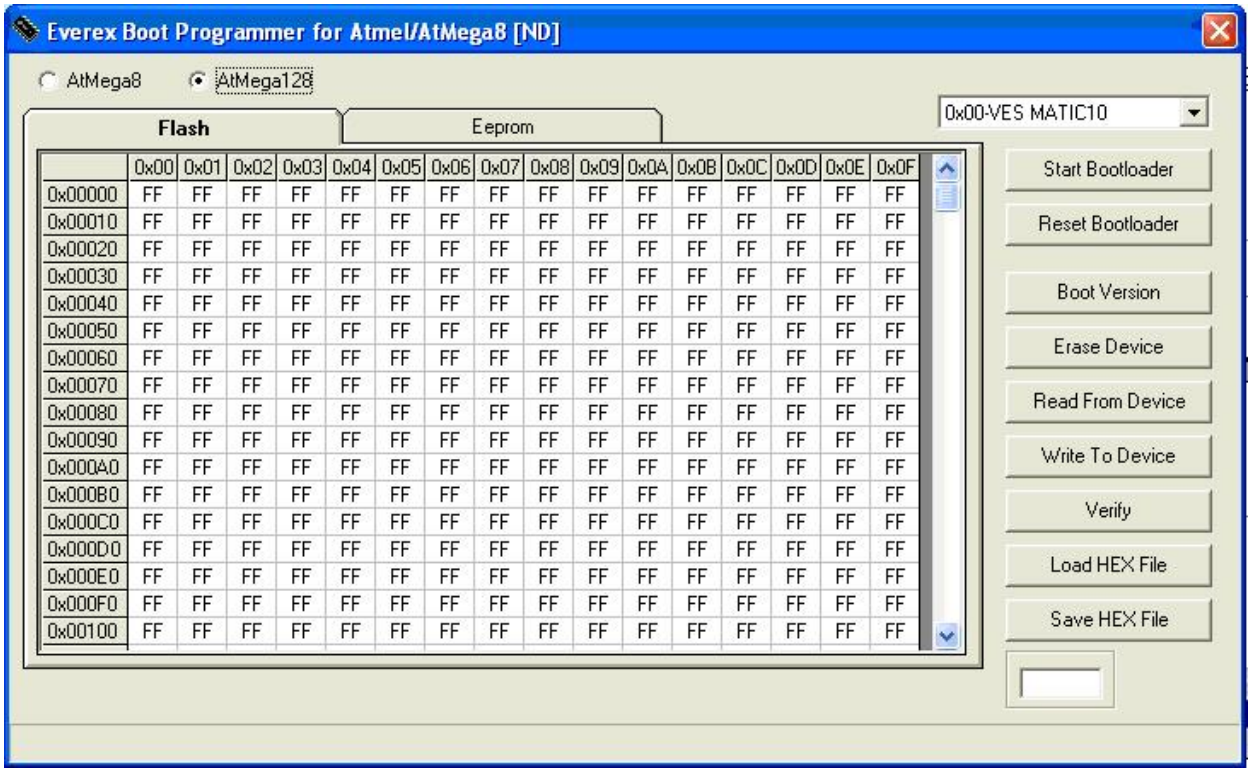


3. If the ports do not corresponds, set the correct port in the winbootprg.ini file and save the new settings.

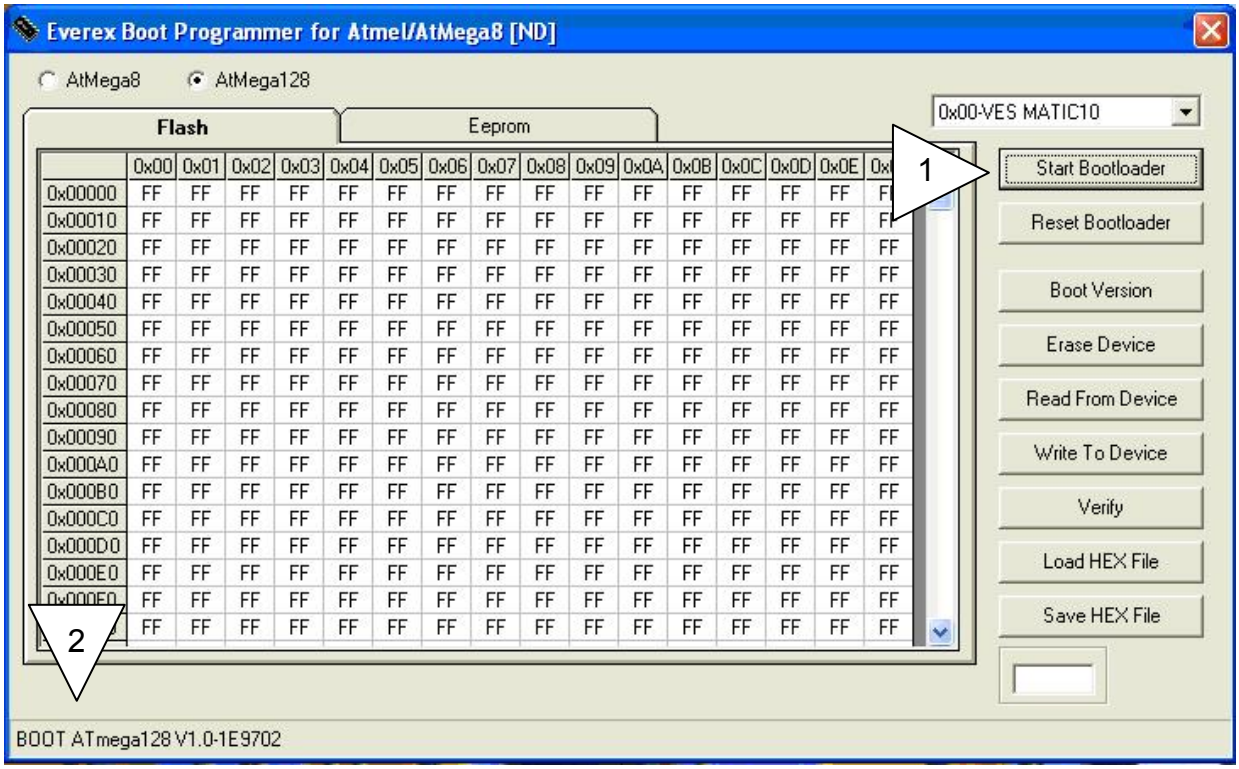
3. PROGRAMMING PROCEDURE / UPGRADE SOFTWARE

1. Connect the VesMatic 10 to the PC (see Attachment A) and turn it on.
2. Start the WinBootPrg.exe program from the tool bar on the PC:

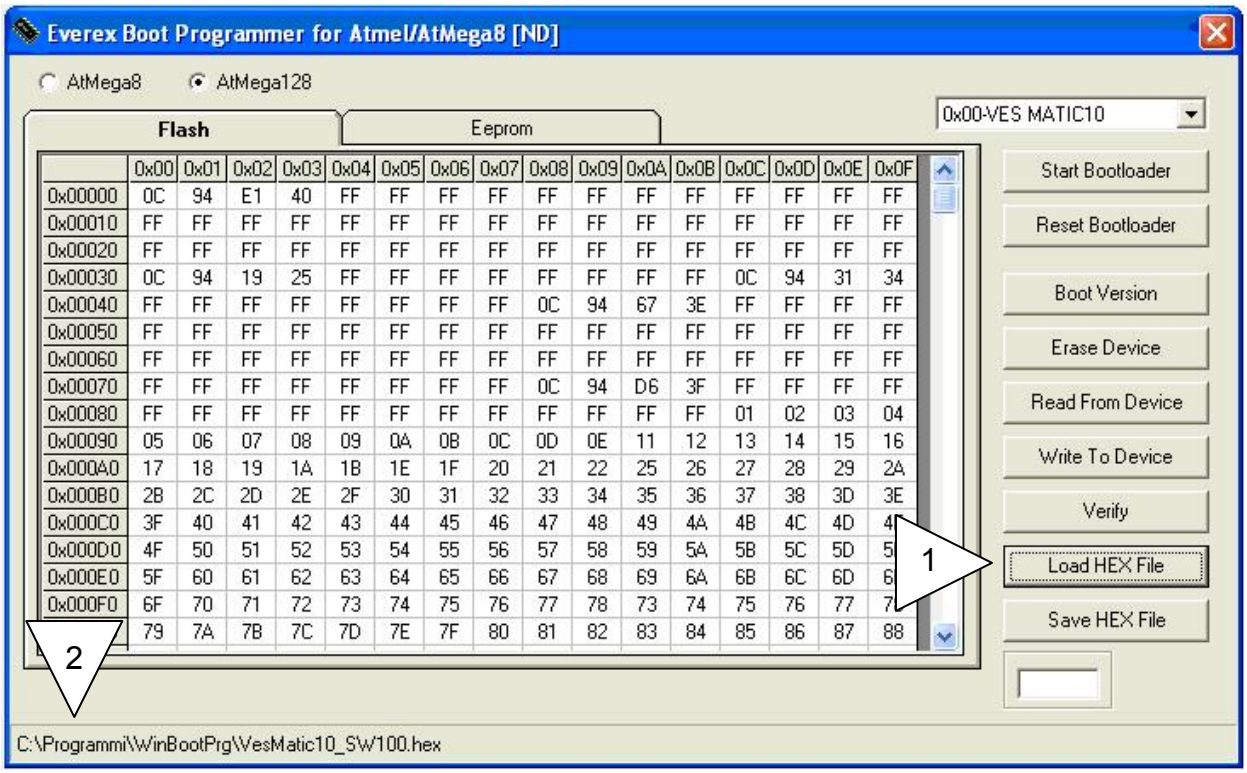
3. During startup, set the program for the microprocessor assembled on the CPU: ATMEGA128.



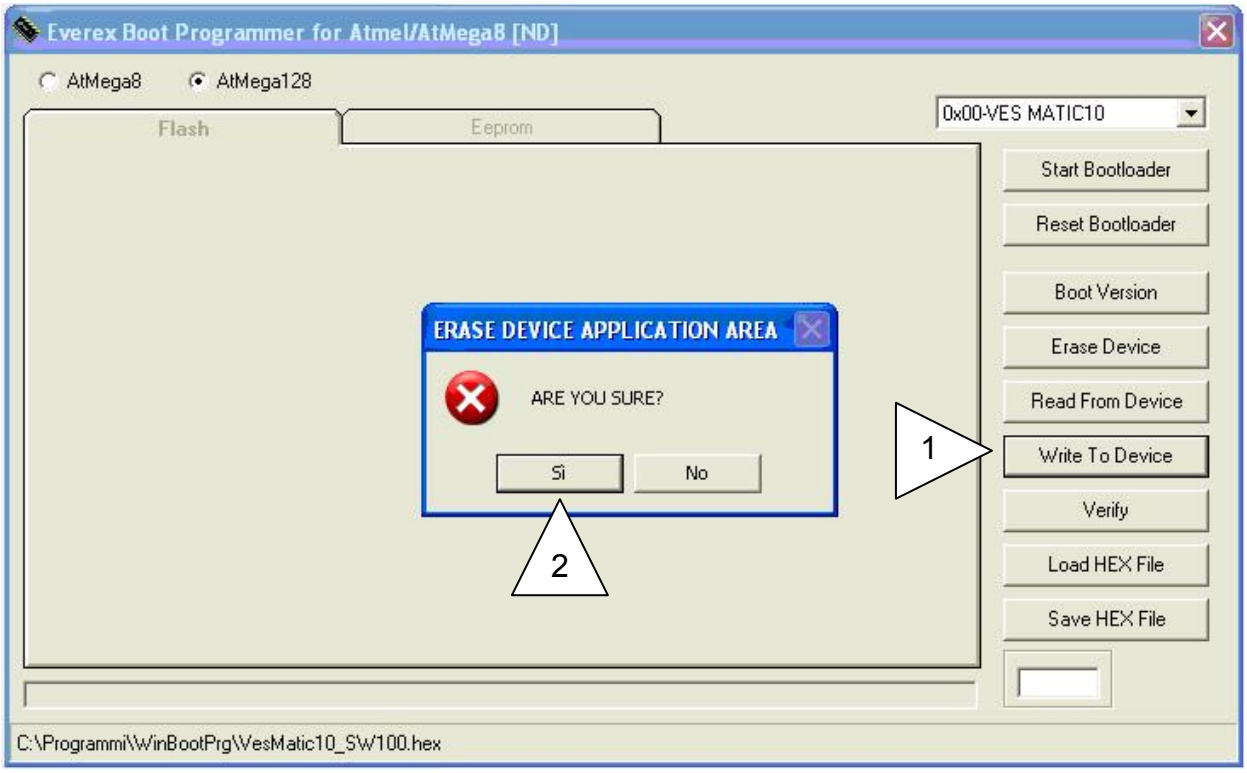
4. Ensure that the instrument is shown in the Select Function menu and launch the program in the instrument CPU to update the application software: select the **Start BootLoader** push-button (1) and ensure that the BootLoader program version (2) is shown in the bar.



5. Select the application file: press **Load HEX File** (1) and recall the VesMatic10_SWXXX.hex (2) file previously saved in C:\Programmi\ WinBootPrg.



6. Start programming the system: select **Write To Device** (1) and, when requested, press **YES** (2) to confirm.



7. When programming is completed, turn the instrument off and on again to ensure that the application software version displayed on screen corresponds to the update version.
8. To exit the **WinBootPrg** program, click on the **X (Close)** in the upper right part of the screen.

Forms

Complaint Form

DATA

Product:	
S/N:	
SW Release:	
D.D.T.	
Date	
Warranty YES ☐ NO ☐	

Customer:	
Ref.:	
Address:	
Phone:	
Fax:	
E-mail:	

LAST TECHNICAL SERVICE on the product:
Executed by: _____ Date: _____

DETAILED DESCRIPTION OF THE PROBLEM

COMMENTS FROM THE CUSTOMER

INSIDE USE ONLY

Type of complaint:
- ☐ Shipment
- ☐ Product
- ☐ Technical Service

Forward to:
- ☐ Sales Dept. _____
- ☐ Technical Dept. _____
- ☐ Purchase Dept. _____
- ☐ Quality Management _____
- ☐ _____ _____

Reply Time
- ☐ by _____ days
- ☐ URGENT

Reply to _____ Fax: _____
E-mail: _____

Notes:
To better understand and solve the problem we suggest to:
1.Fill this form in alla the parts (except the last one)
2. Annex to this form (if available):
- all the documentation supplied by the customer (printed reports; pictures etc.)
- all the documents supplied by the technical persone (es.settings printout; reports etc.)

Signature _____ Date _____

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